Main
OHIO STATE UNIVERSITY
FEB9
Depository
RECEIVED
JAN 30 1978
O.S.U. LIBRARIES

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 11, NUMBER 2
JANUARY 15, 1978

TC1
S45
V11
No2

W78-00501 -- 00900
CODEN: SWRABW

SELECTED WATER RESOURCES ABSTRACTS is produced by the Office of Water Research and Technology, U.S. Department of the Interior, and published twice monthly by the National Technical Information Service (NTIS), U.S. Department of Commerce, for the Water Resources Scientific Information Center (WRSIC).

SELECTED WATER RESOURCES ABSTRACTS (SWRA) is available to Federal agencies and their contractors or grantees in water resources research upon request, citing contract or grant number and sponsoring agency. Write: Manager, Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior, Washington, DC 20240.

Some documents abstracted in this journal can be purchased from NTIS. Price codes are given in the entries and a current code-price conversion table is attached to the outside back cover. Other documents are available from originating organizations or authors as indicated in the citation.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from NTIS, 5285 Port Royal Road, Springfield, VA 22161. Annual subscription rates for the North American Continent are: SWRA Journal only, $75; Journal and Annual Indexes, $100; Indexes only, $50. Other addressees, write prices.

SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 2
JANUARY 15, 1978

W78-00501 -- 00900

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

CONTENTS

FOREWORD iii

SUBJECT FIELDS AND GROUPS

Please use the edge index on the back cover to locate Subject Fields and Indexes.

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

HYDROLOGIC MODELING OF THE DEVILS LAKE BASIN WATERSHEDS,
North Dakota Water Resources Research Inst., Fargo.
For primary bibliographic entry see Field 4D.
W78-00569

MULTIPURPOSE USE OF CATCHMENT MODELS FOR OPERATIONAL FORECASTING AND PLANNING STUDIES,
Institut fuer Wasserwirtschaft, Berlin (East Germany).
A. Becker.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, 1975, p 22-27. 3 fig, 9 ref.

Descriptors: *Water resources, *Control, *Planning, *Hydrology, *Simulation analysis, Forecasting, Flow, Water balance, Short-term planning, Long-term planning, Hydrographs, Stochastic processes, Mathematical models, Operations research, Flood control, Summer.
Identifiers: *Catchment models, Flow recession.

The first version of the integrated hydrological catchment model EGMO was presented at the Warsaw Symposium in 1971. Since then it has been improved and tested and then applied in the solution of different problems in operational hydrology and water resources control planning. Five applications of the improved EGMO model indicate that such models can be used effectively for deterministic forecasting and--as a necessary submodel--for stochastic flow simulation in river basins. Herein, the following cases of model testing and application are briefly described: Deterministic---operational short-term forecasting of catchment outflow, forecasting of flow recession, and long-term water balance calculation; and Stochastic-deterministic---simulation of summer flow, flood flow simulation, and flood control planning. (See also W77-10419) (Bell-Cornell)
W78-00635

MATHEMATICAL MODEL OF ULUOVA PLAIN, TURKEY - A TRAINING AND MANAGEMENT TOOL,
Belgrad Univ. (Yugoslavia).
J. Karanjac, M. Altunkaynak, and G. Ovul.
Ground Water, Vol. 15, No. 5, p 348-357, September-October 1977. 10 fig, 2 tab, 2 ref.

Descriptors: *Mathematical models, *Aquifer management, *Bodies of water, *Surface-groundwater relationships, Groundwater resources, Groundwater recharge, Groundwater availability, Water wells, Pumping, Hydrogeology, Computer models, Training, Water management(Applied), Drawdown, Foreign countries, Foreign research.
Identifiers: *Uluova Plain(Turkey), *Lake Keban(Turkey).

The modelling of the Uluova Plain in southeastern Turkey was a part of training offered to Turkey's State Hydraulic Work's staff within a UNDP project. The modelling of the 341-sq km plain started with the simple steady-state version, but the model gradually was made more and more complex. At the end of modelling, the entire groundwater system was subjected to various automatic controls. The interesting feature of the model was the interaction between surface water (Keban Reservoir) and groundwater. Lake Keban started encroaching upon the plain in 1974, and by the middle of 1976 it occupied over 100 sq km of the plain. The modelling showed that the planned increase in groundwater withdrawal from about 17 million cubic meters (MCM) in 1975 to about 30 MCM in 1976 was quite realistic and completely sustained by the aquifer. The maximum drawdowns in the 1974-1980 period are of an order of magnitude of 20 meters. Another sharp increase in groundwater development from 30 to 58 MCM that was foreseen for 1981 would create drawdowns in some areas in excess of 35 m. The Uluova model incorporates some advanced and new routines in integrated surface water-groundwater simulation. (Visocky-ISWS)
W78-00692

THE OCCURRENCE OF DROUGHT AND ITS PROBABILITIES IN THE BAIXADA FLUMINENSE, RIO DE JANEIRO, (IN PORTUGESE),
Instituto de Pesquisa Agropecuaria do Centro-Sul, Mato Grosso (Brazil).
D. M. De Menezes, J. Ellis, and S. K. Mueller.
Pesqui Agro Pecu Bras Ser Agron. 8(7), p 181-185, 1973.

Descriptors: *Drought, *Probability, South America, *Data collections, Moisture deficit, Markov processes, *Model studies, Rainfall.
Identifiers: Rio-De-Janeiro, *Brazil(Baixada Fluminense).

The consecutive days without rain for the 30 yr period of 1941 through 1970 are tabulated. The data were taken from the daily record of the Climatological Section of the Instituto de Pesquisa Agropecuaria do Centro-Sul. The data were analyzed statistically utilizing the 1st order Markov chain probability model. The probabilities are derived for the Baixada Fluminense area (Rio de Janeiro, Brazil). The major dry periods were recorded in the months of June, July and Aug. The range of probabilities of dry periods of 5 days duration or longer were from 10% in Dec. to 51% in August. Transition months were noted in April and May and again in Sept.--Copyright 1975, Biological Abstracts, Inc.
W78-00843

2B. Precipitation

WATER CONDITIONS IN CALIFORNIA, BASIC DATA SUPPLEMENT.
California State Dept. of Water Resources, Sacramento. Snow Surveys Branch.
California Cooperative Snow Surveys, Bulletin No. 120-77, July 1977. 3 fig, 5 tab.

Descriptors: *Snow surveys, *Water resources, *California, *Data collections, Precipitation(Atmospheric), Runoff, Storage, Reservoirs, Reservoir storage, Snowpacks, Density, Moisture content, Profiles, Snow, Water supply.
Identifiers: Water conditions.

This Basic Data Supplement contained snow survey and aerial marker data collected from January through June and precipitation and runoff data from January through May. Also included were May 1 storage in major reservoirs and selected graphical data on snow depth, density, and water content. (Sims-ISWS)
W78-00545

PRECIPITATION (RADAR) PROJECT OF THE IFYGL LAKE METEOROLOGY PROGRAM,
Center for the Environment and Man, Inc., Hartford, CT.
J. W. Wilson, and D. M. Pollock.
International Field Year for the Great Lakes Bulletin (Special), No. 20, July 1977. 52 p, 10 fig, 8 tab, 29 ref, 1 append. NOAA 03-5-022-17.

Descriptors: *Precipitation(Atmospheric), *Great Lakes, *Rain gages, *Radar, *Lake Ontario, Networks, Measurement, Rainfall, Snowfall, Lakes, Effects, Watershed(Basins), Data collections, Projects, Reviews, Climatology, Meteorology, Limnology.
Identifiers: *International Field Year for the Great Lakes.

Precipitation measurements for Lake Ontario and its watershed were derived for the 1-year period from April 1972 to March 1973 of the International Field Year for the Great Lakes (IFYGL). Eight techniques were used in obtaining the estimates. Seven of the techniques were based solely on precipitation gage data. The eighth combined data from 2 weather radars and from 167 precipitation stations to produce a detailed precipitation analysis for the entire basin for each day of the Field Year. The precipitation observation systems and measurement techniques were described, and measurements were compared. Accuracies of the precipitation estimates were evaluated based largely on withheld data from 3 mesonetworks of rain gages. The average error in the monthly precipitation amounts for the watershed was less than 5% and between 10 and 15% for overlake estimates. In addition, it was estimated that the measurements for the warm season average another 7% too low. Confidence in the precipitation estimates and accuracy figures for the cold season was relatively low because of difficulties in accurately measuring snowfall. The lake had a discernable effect on the precipitation approximately 1/2 of the precipitation days. During the warm season, the lake's effect was the suppression of shower activity over the lake, and during the cold season the effect was the initiation of shower activity over and downwind of the lake. The days on which the lake had the greatest impact on precipitation patterns were characterized by scattered, light showers. Thus, while the lake frequently influences precipitation patterns, its effect on total season precipitation was less apparent. (Sims-ISWS)
W78-00546

MONTHLY RAINFALL IN THE UPPSALA-FIELD,
Uppsala Univ. (Sweden). Dept. of Meteorology.
T. Bergeron.
Mesometeorological Studies of Precipitation, V, Report No. 38, 1973. 49 p, 37 fig, 16 ref.

Descriptors: *Rainfall, *Distribution patterns, *Monthly, Orography, Convection, *Maps, Precipitation(Atmospheric), Rain gages, Data processing, Analytical techniques, Data collections, Networks, Weather patterns, Meteorology.
Identifiers: *Uppsala(Sweden), *Sweden.

Forty-nine monthly rainfall maps for an area around Uppsala, Sweden, were presented for the period 1955-1965. The rainfall patterns shown by the maps were discussed. The orography effects on the rainfall patterns were pointed out. (See also W76-13186) (Sims-ISWS)
W78-00548

A REGISTRATION UNIT FOR DRAIN OUTFLOW, GROUNDWATER DEPTH AND PRECIPITATION,
Institute for Land and Water Manage Research, Wageningen (Netherlands).
For primary bibliographic entry see Field 7B.
W78-00682

A COMPARATIVE STUDY OF THE EFFECTS OF ALBEDO CHANGE ON DROUGHT IN SEMI-ARID REGIONS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
J. Charney, W. J. Quirk, S-H. Chow, and J. Kornfield.

Journal of the Atmospheric Sciences, Vol 34, No 9, p 1366-1385, September 1977. 23 fig, 8 tab, 27 ref, append.

Descriptors: *Albedo, *Precipitation(Atmospheric), *Droughts, *Model studies, Radiation, Solar radiation, Rainfall, Evaporation, Evapotranspiration, Monsoons, Semiarid climates, Deserts, Groundwater, Climatology, Meteorology.

Results from a series of numerical simulations were presented to show the effects of changes in albedo on rainfall in 6 areas, 2 each in Africa, Asia and North America. Each pair consists of a semi-arid area lying at the boundary between a major desert and an adjacent monsoonal region, and an area of the same size located within the monsoonal region itself. The sensitivity of the rainfall to the ground hydrology was determined by performing the albedo simulations with 2 different evapotranspiration parameterizations, 1 giving too high evaporation over land, and the other giving negligible evaporation over land. In the high evaporation case, an albedo change from 0.14 to 0.35 caused large decreases of rainfall in all 3 of the semi-arid test areas and in 2 of the 3 monsoonal test areas. In the negligible evaporation case, the simulations were performed only for the 3 semi-arid areas; in this case, the albedo increase produced a significant decrease in rainfall in only 1 of the areas, the Sahel. Intercomparison of the high and negligible evaporation cases showed that changes in evaporation rate are as important as changes in albedo. Thus, in all but 1 of the 6 areas, local evaporation was a major factor in influencing rainfall. When appreciable evaporation occurs, the mechanism by which an increase of albedo reduces the rainfall is as follows: Initially, the increase of albedo acts to reduce the absorption of solar radiation by the ground and, therefore, the transfer of sensible plus latent heat into the atmosphere. The resulting reduction in convective cloud tends to compensate for the increase of albedo by allowing more solar radiation to reach the ground, but it reduces the downward flux of longwave radiation even more, so that the net absorption of radiation by the ground, solar plus longwave, is decreased. Thus, with or without evaporation, the increase of albedo causes a net decrease of radiative flux into the ground and, therefore, a net decrease of convective cloud and precipitation. (Sims-ISWS)
W78-00686

LIDAR OBSERVATIONS OF HIGH PLAINS THUNDERSTORM PRECIPITATION,
Wyoming Univ., Laramie. Dept. of Atmospheric Science.
K. Sassen.
Journal of the Atmospheric Sciences, Vol. 34, No. 9, p 1444-1457, September 1977. 15 fig, 2 tab, 12 ref. NSF ATM75-02515.

Descriptors: *Remote sensing, *Thunderstorms, *Model studies, Precipitation(Atmospheric), Cloud physics, Snow, Ice, Crystals, Graupel, Rainfall, Clouds, Storms, Measurement, Instrumentation, Meteorology.
Identifiers: *Lidar, Bright bands, Precipitation mechanisms.

The results of a field program using a polarization diversity lidar system to study high plains thunderstorm precipitation were given. The presence of 'reflectivity' bright bands of the general form predicted by a numerical simulation indicated that ice phase precipitation processes were predominantly acting in the storms studied. Depolarization profiles through the melting region, evaluated on the basis of CW laser scattering measurements, were shown to aid in the discrimination of the ice particle types causing the bright bands. Depolarization and returned energy signatures due to graupel were present, primarily during the developing stage, consistent with recent findings in northeastern Colorado. However, melting snowflake signatures were observed predominantly during the mature thunderstorm stage, suggesting that the contribution to thunderstorm rainfall from the ice crystal aggregation process generally has been underestimated. It also was significant that the use of lidar in the study in a manner similar to microwave radar indicated the potential of the lidar depolarization technique for future operational programs of atmospheric research. (Sims-ISWS)
W78-00687

A STUDY OF THE RELIABILITY, DEFICIENCIES AND EXCESSES OF RAINFALL OVER THE HARYANA STATE,
Haryana Agricultural Univ., Hissar (India).
O. P. Bishnoi.
Indian Journal of Meteorology, Hydrology and Geophysics, Vol. 26, No. 2, p 211-214, April 1975. 14 fig, 5 ref.

Descriptors: *Rainfall, *Droughts, *Precipitation excess, Precipitation(Atmospheric), Spatial distribution, Rainfall disposition, Monsoons, Maps, Probability, Statistical methods, Data processing, Weather data, Meteorology.
Identifiers: *Haryana(India).

The rainfall data of Haryana State, India, rain gauge stations were analyzed to study the reliability of rainfall on probability basis. Maps were depicted which show the probabilities of occurrence of rainfall of less than 100, 200, 300, 400, and 500 mm during the southwest monsoon season. The maps also show the percentage number of years of significant excesses/deficiencies of rainfall and give information regarding the rainfall distribution in the State. The maps give an idea of the confidence with which certain amounts of rainfall can be expected over the different regions in the State. (Sims-ISWS)
W78-00698

WATER CONDITIONS AND FLOOD EVENTS IN CALIFORNIA, WATER YEAR 1975-76.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2E.
W78-00718

1975 ANNUAL REPORT.
National Oceanic and Atmospheric Administration, Oak Ridge, Air Resources Atmospheric Turbulence and Diffusion Laboratory, TN.
For primary bibliographic entry see Field 5A.
W78-00721

SUMMARY OF ACTIVITIES AND PLANS-FY 1976-1977,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00722

METEOROLOGICAL EFFECTS OF ENERGY DISSIPATION AT LARGE POWER PARKS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00723

PHOTOGRAPHIC ASSESSMENT OF DECIDUOUS FOREST RADIATION REGIMES,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
B. A. Hutchison.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 45-219, September 1976. 69 fig, 8 tab, 102 ref. NSF AG-199, BMS69-01147 A09.

Descriptors: *Radiation, *Solar radiation, *Forests, Model studies, On-site investigations, On-site data collections, Mathematical models, Light, Light intensity, Microenvironment, Vegetation, Trees, Photography, Hardwood, Deciduous forests, Forestry, Meteorology.
Identifiers: Forest canopy.

A model of forest radiation was proposed that assumes that radiation in the forest is composed of a spatially non-varying diffuse component, upon which is superimposed a spatially varying direct beam component. Structural parameters required to drive the model were obtained from measurements made on hemispherical canopy photographs. Predictions calculated using the model and measurement approach were compared to observed data collected in the forest on clear, partly cloudy, and overcast days. Agreement between prediction and observation generally was poor. The assessment technique overestimates the penetrating, transmitted, and down-reflected diffuse radiation in the forest on all days, and it underestimates the transmitted and down-reflected direct beam radiation on clear to partly cloudy days. The predicted space distributions of direct beam radiation extend to higher flux densities than were observed, and the predicted distributions were bimodal. Only at the 16 meter level around midday is there any evidence of bimodality in the observed data. Lack of agreement between prediction and observation was attributed to photo exposure problems and deficiencies in the model. Methods of minimizing the problem arising from photo exposure and modifications of the model were suggested, and further test of this assessment technique were proposed. (See also W78-00721) (Sims-ISWS)
W78-00725

MODELING SMOG ALONG THE LOS ANGELES-PALM SPRINGS TRAJECTORY,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00726

RESEARCH REQUIRED FOR PREDICTING THE BEHAVIOR OF PRESSURIZED GASES ESCAPING INTO THE ATMOSPHERE,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00727

TIME DEPENDENT MESOSCALE WIND FIELDS OVER COMPLEX TERRAIN,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
C. J. Nappo, Jr.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 293-309, September 1976. 8 fig, 1 ref.

Descriptors: *Winds, *Topography, *On-site investigations, *Tennessee, Temporal distribution, Spatial distribution, Variability, Mountains, Stability, Balloons, Atmosphere, Meteorology.
Identifiers: *Mesoscale wind fields, Trajectories, Tetroons.

Wind soundings simultaneously made at 5 stations over a mesoscale region of complex terrain during the Eastern Tennessee Trajectory Experiment (ETTEX) were analyzed, objectively, vertically averaged, and interpolated over a uniform grid. The temporal and spatial variability of the resulting mesoscale wind field was examined for several

observation periods, each lasting about 6 hours. Finally, the observed trajectories of tetroons were compared with trajectories computed using wind fields measured during the tetroon flights. A result of the analysis was that during stable night time conditions, the wind field has marked horizontal variability which diminishes with the development of convective boundary layer. Hence, terrain effects may be more significant in their effect on the mesoscale flow at night than during the day. (See also W78-00721) (Sims-ISWS)
W78-00728

ATMOSPHERIC DISPERSION MODELS FOR ENVIRONMENTAL POLLUTION APPLICATIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00729

RELATIVE DIFFUSION OF TETROON PAIRS DURING CONVECTIVE CONDITIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 357-363, September 1976. 5 fig, 1 tab, 17 ref.

Descriptors: *Winds, *Diffusion, *Tennessee, On-site investigations, Balloons, Shear, Convection, Turbulence, Data processing, Meteorology.
Identifiers: *Tetroons.

Observations of the relative diffusion of 13 sets of tetroon pairs in the mixed layer during convective conditions in eastern Tennessee were reported. The root-mean-square separation, S, is proportional to time, t, raise to a power of 1 for times from 2 to 30 min and a power of 0.75 for times from 30 to 100 min. On the average, the observations are satisfied by the approximation dS/dt = sigma sub v, where sigma sub v is the standard deviation of the lateral wind speed fluctuations, as sensed by the tetroon. (See also W78-00721) (Sims-ISWS)
W78-00731

STANDARD DEVIATION OF WIND DIRECTION AS A FUNCTION OF TIME; THREE HOURS TO FIVE HUNDRED SEVENTY-SIX HOURS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
W. M. Culkowski.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 377-385, September 1976. 2 fig, 1 tab, 7 ref.

Descriptors: *Winds, *Dispersion, *Air pollution, Data processing, Statistics, Time, Climatology, Pollutants, Path of pollutants, Powerplants, Meteorology.
Identifiers: Standard deviation, Wind directions.

The standard deviation of horizontal wind direction, sigma sub theta increases with time of averaging up to a maximum value of 104 degrees. The average standard deviation of horizontal wind directions averaged over periods of 3, 5, 10, 16, 24, 36, 48, 72, 144, 288, and 576 hours were calculated from wind data obtained from a 100 meter tower in the Oak Ridge area. For periods up to 100 hours, sigma sub theta is proportional to t to the 0.28 power; after 100 hours sigma sub theta is proportional to 6.5 ln t. (See also W78-00721) (Sims-ISWS)
W78-00733

BEAM ENRICHMENT OF DIFFUSE RADIATION IN A DECIDUOUS FOREST,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
B. A. Hutchinson, and D. R. Matt.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 395-423, September 1976. 6 fig, 4 tab, 10 ref, 1 append. ERDA AG-199, BMS69-01147 A09.

Descriptors: *Radiation, *Solar radiation, *Forests, *Model studies, Mathematical models, On-site investigations, On-site data collections, Deciduous forests, Trees, Vegetation, Light, Light intensity, Forestry, Meteorology.

By applying a model to solar radiation data collected in and above an East Tennessee deciduous forest, solar radiation budgets were approximated for 3 forest levels within the winter leafless, spring leafless, summer fully leafed, and autumnal fully leafed forest phenoseasons. Beam radiation dominates the budgets throughout the year and varies directly with solar elevations. Although beam radiation penetration is severely reduced in the fully leafed forest, the component still accounts for over 1/2 the total radiation received within the forest in early autumn, the phenoseason of minimal beam penetration. Beam enrichment of diffuse radiation within the forest is also highly dependent upon solar elevation and canopy biomass density. Maximum beam enrichment occurs in summer with the high solar elevation of that season and a fully leafed canopy. Minimum enrichment occurs in the leafless winter forest when solar elevations are lowest and canopy biomass density is minimal. The penetration of diffuse sky radiation is maximal in the leafless forest and minimal in the fully leafed forest but, because of limitations of the model used in the approximation, the quantity appears insensitive to changes in solar elevations. The mentioned limitation is a defect of the model, but it should not alter substantially the indicated results. (See also W78-00721) (Sims-ISWS)
W78-00735

UNIFORMITY AMONG WEATHER MODIFICATION LAWS,
Arizona Univ., Tucson. School of Law.
R. J. Davis.
Journal of the Irrigation and Drainage Division, Proceeding of ASCE, Volume 102, No IR3, p 285-294, September 1976. 1 tab, 11 ref. OWRT A-064-ARIZ(3).

Descriptors: *Weather modification, *Cloud seeding, Precipitation(Atmospheric), Rainfall, *Water law, Legislation, Legal aspects.
Identifiers: *Water modification loss.

Advocates of weather modification would do well to consider the advantages of uniformity and of diversity in laws relating to cloud seeding. They should support state legislation that promotes uniformity where it is useful and retains diversity where it is rational to do so. When additional federal legislation is considered, the weather modification community should press for provisions that permit retention of diversity among states where it is advantageous. Neither Procrustes nor Balkalnization should prevail. (See also W76-10809 and W76-00923) (Skogerboe-Colorado State)
W78-00745

THE DROUGHT,
Geological Survey, Reston, VA. Water Resources Div.
T. J. Buchanan, and B. K. Gilbert.
Water Spectrum, Vol 9, No 2, p 6-12, Summer 1977.

Descriptors: *Droughts, *United States, *Water shortage, *Environmental effects, *Rationing(Water), Surface waters, Groundwater resources, Agroclimatology, Hydroelectric power, Recreation, Water supply, Water conservation, Water management(Applied).

Water supply problems are legion but the most severe so far in the United States during 1977 are in the northern half of California. In that area, Water rationing with both mandatory and voluntary restrictions is being implemented in many communities. In some areas of Oregon, there have been industrial layoffs because of water cutbacks, and similar circumstances are anticipated in other stricken areas. Agriculture has been seriously affected throughout the current drought. In the Northwest, which relies on hydropower for 80 percent of its electricity, reservoir content is well below normal; the snow pack is extremely deficient; and, consequently, the outlook for power production this summer is very bleak. In many places, there has been insufficient water in the streams for spawning by various species of fish; in other areas streams have dried up, killing the entire fish population. Recreational opportunities have also been curtailed. In addition to voluntary conservation measures and rationing, efforts are underway in many areas to tap new supplies and redevelop old ones. Thousands of wells have been drilled and a multitude of existing wells are being deepened in an attempt to provide relief to domestic, municipal, industrial and agricultural users. To assist the affected areas, President Carter has proposed a comprehensive drought-assistance package that asks for $594 million in loans and $250 million in grant monies. (Woodard-USGS)
W78-00807

RELATION BETWEEN EARTHQUAKES, WEATHER, AND SOIL TILT,
Geological Survey, Reston, VA. Geologic Div.
For primary bibliographic entry see Field 7B.
W78-00823

THE OCCURRENCE OF DROUGHT AND ITS PROBABILITIES IN THE BAIXADA FLUMINENSE, RIO DE JANEIRO, (IN PORTUGESE),
Instituto de Pesquisa Agropecuaria do Centro-Sul, Mato Grosso (Brazil).
For primary bibliographic entry see Field 2A.
W78-00843

2C. Snow, Ice, and Frost

FUTURE SEA-LEVEL CHANGES DUE TO WEST ANTARCTIC ICE SHEET FLUCTUATIONS,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research; and Cooperative Inst. for Research in Environmental Science, Boulder, CO.
J. A. Clark, and C. S. Lingle.
Nature, Vol 269, No 5625, p 206-209, September 15, 1977. 4 fig, 13 ref. NSF DES74-13047-A01, NSF EAR74-13047-A02.

Descriptors: *Forecasting, *Sea level, *Model studies, *Glaciology, *Antarctic, Glaciohydrology, Mathematical models, Melt water, Equations, Geophysics, Variability, Water levels.
Identifiers: *West Antarctic ice sheet, Ice thinning, Global sea level changes.

Global sea level changes which would result from an instantaneous uniorm thinning of the possibly unstable West Antarctic ice sheet were calculted and found to be nonuniform. Sea level changes corresponding to future changes in the West Antarctic ice sheet will be affected by (1) changes in gravitationsal attraction exerted by the ice sheet on the surrounding ocean, (2) the Earth's immediate elastic response to changed ice and water

loads, and (3) the Earth's long-term response due to viscous flow within the mantle. At locations distant from the ice sheet (Hawaii, New York, the North Sea), immediate submergence would be followed by gradual emergence. At New Zealand, immediate submergence would be followed by gradual additional submergence, then slow emergence would begin after 2,500 yr. At locations close to the ice sheet (Cape Horn, the Ross Ice Shelf), the sea level would fall for 1,100 yr, then rapid submergence would start resulting in a net sea level rise after 10,000 yr equal to about 92% of the average global rise. (Humphreys-ISWS)
W78-00518

WATER CONDITIONS IN CALIFORNIA, BASIC DATA SUPPLEMENT.
California State Dept. of Water Resources, Sacramento. Snow Surveys Branch.
For primary bibliographic entry see Field 2B.
W78-00545

LIDAR OBSERVATIONS OF HIGH PLAINS THUNDERSTORM PRECIPITATION,
Wyoming Univ., Laramie. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W78-00687

PREDICTION OF ARCTIC ICE CONDITIONS FOR OPERATIONS,
Washington Univ., Seattle. Arctic Ice Dynamics Joint Experiment Office.
For primary bibliographic entry see Field 5G.
W78-00860

SEA ICE THICKNESS PROFILING AND UNDER-ICE OIL ENTRAPMENT,
Cold Regions Research and Engineering Lab., Fairbanks, AK.
For primary bibliographic entry see Field 5G.
W78-00861

2D. Evaporation and Transpiration

EFFECT OF TRANSPIRATION OF SOIL WATER AVAILABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
M. E. Ginzburg.
Vestn Mosk Univ Ser Vi Biol Pochvoved 30(1), p 81-86, 1975.

Descriptors: *Transpiration, *Soil water, Soil moisture, *Moisture content, Plant growth.
Identifiers: *Soil moisture pressure.

The level of potential transpiration greatly influences the dependence of relative transpiration on soil moisture pressure. In estimating the soil water availability to plants by soil moisture pressure, the meteorological conditions must be considered.--Copyright 1976, Biological Abstracts, Inc.
W78-00506

DEPENDENCE OF TRANSPIRATION AND DIFFUSION PRESSURE IN PLANTS ON SOIL MOISTURE CONTENT AND POTENTIAL, (IN BULGARIAN),
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Hydrotechnics and Ameliorations.
S. Koleva.
Fiziol Rast (SOFIA) 1(2), p 63-72, 1974.

Descriptors: *Transpiration, *Diffusion, Plant growth, *Soil moisture, *Moisture content, Corn(Field), Temperature.

The dependence of plant (corn) transpiration and diffusion pressure deficit (DPD) on the soil moisture content and potential is discussed. Higher temperature leads to a reduced rate of transpiration in the case of higher soil moisture content, especially at lower moisture potential. At equal temperature conditions the more compact soil reduces the rate of transpiration in case of higher moisture content. Soil moisture critical for the transpiration rate ranges in accordance with the meteorological and soil conditions of the investigation within the limits of 70-100% of the maximum field water capacity or within the limits of 0.3-3.5 atm. The DPD of the plants did not surpass 4 atm. of water potential within the mentioned limits at soil density 1.34g/cm. When the soil density was 1.5g/cm2 and DPD of the soil solution was about 2 atm., the DPD of the plants reached 5-6 atm., i.e., more compact soil makes difficult the plant water supply at higher soil moisture, respectively at lower moisture pressure.--Copyright 1976, Biological Abstracts, Inc.
W78-00515

A COMPARATIVE STUDY OF THE EFFECTS OF ALBEDO CHANGE ON DROUGHT IN SEMI-ARID REGIONS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W78-00686

SIGNIFICANCE OF VEGETATION IN INTERPRETING THERMAL RADIATION FROM A TERRESTRIAL SURFACE,
Florida Univ., Gainesville. Dept. of Fruit Crops.
For primary bibliographic entry see Field 7B.
W78-00694

PHOTOGRAPHIC ASSESSMENT OF DECIDUOUS FOREST RADIATION REGIMES,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00725

BEAM ENRICHMENT OF DIFFUSE RADIATION IN A DECIDUOUS FOREST,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00735

CONTRIBUTIONS TO THE STUDY OF WATER BALANCE ELEMENTS IN THE REDDISH-BROWN SOIL AREA OF BANEASA-BUCHAREST, (IN ROMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
X. L. Tran, C. I. Florescu, and A. Canarache.
An Inst Stud Cercet Pedol. 40, p 115-126, 1972.

Descriptors: *Water balance, Soils, Soil types, *Corn(Field), Mulches, Infiltration, Transpiration, Irrigation, Evaporation, *Moisture content, *Soil moisture.
Identifiers: *Romania(Baneasa-Bucharest), Reddish-brown soils.

The results of an experiment carried out in 1970-1971 in a field planted to corn are described. Observations on moisture content of soil (up to 1.5 m deep) were made twice monthly throughout the vegetation period. The experimental design included cultivated, uncultivated and straw-mulched treatments, as well as treatments covered with plastic foil, and was devised so as to allow the estimation of the 3 elements composing the total water consumption, i.e., evaporation, transpiration and infiltration, by comparing the water consumption in the different treatments. Although irrigation was effective, at a total consumption of 440-560 mm water about 40% are lost by infiltration due to the lack of uniformity in rainfall distribution during the vegetation period, a fact emphasizing the need of reevaluating the measures for a highly effective use of water. Water consumption by evaporation (about 20%) plus transpiration (about 40%) ranged 300-380 mm and was comparable to the total consumption recorded in areas with similar temperature relationships but with a rainfall regime not permitting losses by infiltration.--Copyright 1975, Biological Abstracts, Inc.
W78-00776

REGULATIVE ROLE OF TRANSPIRATION IN TEMPERATURE REGIME OF DRY FRUITS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
A. A. Prokof'ev, B. A. Rybalova, and K. M. Kats.
Fiziol Rast. 21(1), p 108-112, 1974.

Descriptors: *Transpiration, Fruits, Fruit crops, *Temperature, Regulation, Air temperature, Humidity.

The temperature and transpiration of the fruits determined in oil-bearing poppy. The temperature of atmospheric air differed from that within the fruit. In young fruits (up to the 12th day after flowering) with intensive transpiration the temperature within the capsule is lower than the temperature of atmospheric air. In more mature fruits (12-25 days after flowering) with weak transpiration the temperature within the capsule is higher than that of atmospheric air. Incubation of the fruits in humid chambers decreased their transpiration and sharply increased the temperature within the fruits. Intensification of transpiration (by decreasing humidity of surrounding air or by increasing intensity of illumination) reduces the temperature within the fruit. Transpiration of the dry fruits is presumed to play an important role in regulation of the temperature regime within the fruits.--Copyright 1975, Biological Abstracts, Inc.
W78-00841

2E. Streamflow and Runoff

PRESERVATION OF CORRELATION IN GENERATED HYDROLOGIC SAMPLES THROUGH TWO-STATION MODELS,
Birmingham Univ. (England). Dept. of Civil Engineering.
N. T. Kottegoda, and V. Yevjevich.
Journal of Hydrology, Vol. 33, No. 1/2, p 99-121, March 1977. 6 fig, 6 tab, 19 ref. ENG-74-17396,GK-31529x2.

Descriptors: *Time series analysis, *Statistical methods, *Stochastic processes, *Persistence, *Distribution patterns, Data processing, Hydrology, Streamflow, Simulation analysis, *Correlation analysis, Model studies.
Identifiers: *Auto-regressive models, *Data generation, Bivariate models.

The validity of two-station generation models for preserving serial and cross-correlations was investigated by generating 200 samples of annual flows for each of ten river gaging stations. The four models tested were developed by Fiering, Kahan-Lawrence, Yevjevich, and Matalas. Results show biases and variances in estimated autocorrelation and cross-correlation coefficients of generated series, either of historic sample sizes or of samples of size 200. The four models basically are equivalent in their results, leading to the conclusion that the model should be used which is the simplest to apply and has the best physical justification for the series analyzed and modeled. The basic autocorrelation in annual flow series is the result of water retention in the basins. Estimates of the serial correlation coefficients are biased downward, even in the case of a more complex, multivariate model. (Singh-ISWS)

W78-00531

HYDROLOGICAL SYSTEM RELIABILITY AT THE CONFLUENCE OF RIVERS,
Water Resources Centre, Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W78-00637

A TEST FOR DISTINGUISHING BETWEEN EXTREME VALUE DISTRIBUTIONS,
Otago Univ., Dunedin (New Zealand). Dept. of Geography.
W. E. Bardsley.
Journal of Hydrology, Vol. 34, No. 3/4, p 377-381, August 1977. 2 fig, 1 tab, 9 ref.

Descriptors: *Flood frequency, *Analytical techniques, *Distribution patterns, Statistical methods, Methodology, Flood peak, Hydrology, Data processing, Foreign research, Mathematical studies.
Identifiers: *Extreme value distribution, Null hypothesis, Upper bound.

Extreme value distributions were used for estimating probabilities of flood events. The distributions wer Type I, Type II, and Type III: The Type III distribution possesses an upper bound, but the others do not. The correct choice of distribution is important for flood probability studies as the 3 types may differ considerably in their right tails. The choice of distribution was made on the statistical analyses of the available data. A test was postulated where the null hypothesis is the Type-I distribution and the alternative is 1 of the other extreme value distributions. Power curves were given for sample sizes of 50 and 100. (Singh-ISWS)
W78-00681

WATER CONDITIONS AND FLOOD EVENTS IN CALIFORNIA, WATER YEAR 1975-76.
California State Dept. of Water Resources, Sacramento.
Bulletin No. 202-76, July 1977. 86 p, 32 fig, 6 tab, 2 append.

Descriptors: *Water resources, *Floods, *Precipitation(Atmospheric), *California, Rainfall, Snowpacks, Runoff, Reservoir storage, Hydrographs, Streamflow, Rivers, Reservoir operation, Reservoirs, Droughts, Weather, Distribution patterns, Hurricanes, Storms, Water supply, Water transfer, Flash floods, Disasters, Peak discharge, Meteorology, Climatology, Hydrology.

Water year 1975-76 was the third driest year of this century in California. The weather scene was dominated by a persistent high pressure ridge in the atmosphere off the California coast. The blocking high displaced the storm track northward of its usual winter path over California, leaving most of the State deficient in precipitation, runoff, and reservoir storage, and almost devoid of flood events. Ironically, the year also brought the first tropical storm in 30 years to the State. During the water year (October 1, 1975 - September 30, 1976), 28 counties were declared drought disaster areas, and 4 counties were declared flood disaster areas; 3 counties were affected by both disasters. This bulletin included descriptions of weather patterns preceding and during significant storm periods; information on precipitation, snow pack, unimpaired runoff, and reservoir storage; and hydrographs of stream stages and reservoir operations, weir overflow graphs, and tabulation of peak streamflow and stages. (Sims-ISWS)
W78-00718

POSSIBLE FAILURE OF THE LOW-SILL CONTROL STRUCTURE AT OLD RIVER, LOUISIANA, ECONOMIC AND PHYSICAL CONSEQUENCES,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
J. S. Horne.
Louisiana Water Resources Research Institute Bulletin No. GT-5, July 1976. 64 p, 16 fig, 28 ref, append.

Descriptors: *Mississippi River, *Louisiana, *Dam failure, Control structures, Diversion structures, Floods, Flood control, Floodways, Flood damage, River regulation, Risks, Disasters, Water quality, Navigation.
Identifiers: *Disaster planning, *Atchafalaya River(La).

During the record flood of 1973, scouring partially undermined the low-sill control structure at Old River, Louisiana, a gated dam built to regulate permanently the diversion of water into the Atchafalaya River. Failure of the structure, which could occur during a similar flood period, would allow continuously increasing discharge into the Atchafalaya, with serious consequences for south Louisiana. Surface transportation across the Atchafalaya Basin could be curtailed, if not halted, because any of the 5 highway and 4 railroad bridges spanning the main channel could be washed out. Navigation conditions in both the Mississippi and Atchafalaya Rivers would be altered. The flooding of communities in the basin and overtopping of the East and West Basin Protection Levees would be probable. During low water periods, the quality of Mississippi River water downstream from the structure would deteriorate because of salt water intrusion. Hydrocarbon production within the basin would be halted during flood periods and hampered year round by the higher normal stages of the Atchafalaya. The daily transmission of 8.4 billion cubic feet of natural gas and 1.55 million barrels of petroleum products for interstate use, as well as 4 billion cubic feet of natural gas for intrastate chemical industries and power stations, could be halted due to pipeline ruptures during flood periods. Because the increased discharge and backwater flooding of the Atchafalaya River would permanently inundate at least 30,000 more acres, the recreational and commercial value of the lower basin would diminish. Recommended action to reduce the effects of such a failure are the: development of alternate water supplies for industries and municipalities downstream from Old River; rerouting of existing hydrocarbon and electric transmission systems around the basin; controlling of channel erosion to protect bridges; and studying the feasibility of a replacement control structure. (Lee-ISWS)
W78-00719

ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS ON NATURAL-FLOW STREAMS IN MASSACHUSETTS,
Geological Survey, Boston, MA. Water Resources Div.
S. W. Wandle, Jr.
Water-Resources Investigations 77-39 (open-file report), 1977. 26 p, 6 fig, 5 tab, 18 ref.

Descriptors: *Peak discharge, *Floods, *Flood frequency, *Massachusetts, *Streams, Natural flow, Streamflow, Gaging stations, Flow rates, Regional analysis, Forecasting, Regression analysis, Equations, Drainage area, Channel morphology, Precipitation(Atmospheric), Water storage, Evaluation.

The magnitude and frequency of floods on natural-flow streams in Massachusetts, with drainage areas between 0.25 square mile and 497 square miles, may be estimated from drainage area, main channel slope, a precipitation index, and a storage factor. Multiple-regression techniques were used to define the relationship between basin and climatic characteristics, and flood peaks for 113 gaging stations. Flood-frequency and magnitude data at the gaging stations were computed using the guidelines recommended by the U.S. Water Resources Council. It was found that flood peaks of rural, unregulated Massachusetts streams can best be defined by dividing the State into an EASTERN MASSACHUSETTS and a WESTERN MASSACHUSETTS flood-frequency region. The regression equations relate peak discharges with 0.5, 0.2, 0.1, 0.04, 0.02, 0.01, 0.005, and 0.002 exceedance probabilities to basin and climatic parameters. Standard errors of estimate ranged from 42 to 70 percent for the eastern river basins and from 32 to 68 percent for the western river basins. The defined estimating relations do not apply to streams where the flood flows are significantly affected by regulation where the usable man-made storage is over 4.5 million cubic feet per square mile, or by diversions or urbanization, or where the basin indices are outside a specified range. Also, these equations should not be used for basins in eastern Plymouth County, or Barnstable, Dukes, or Nantucket Counties where the available data are insufficient to determine the influence of high infiltration and storage capacities of drainage basins on flood flows. (Woodard-USGS)
W78-00812

PROGRESS REPORT ON STUDY OF MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00816.

2F. Groundwater

NORTHERN KALAHARI GROUNDWATERS: HYDROLOGIC, ISOTOPIC AND CHEMICAL STUDIES AT ORAPA, BOTSWANA,
University of the Witwatersrand, Johannesburg (South Africa). Nuclear Physics Research Unit.
E. Mazor, B. Th. Verhagen, J. P. F. Sellschop, M. T. Jones, and N. E. Robins.
Journal of Hydrology, Vol. 34, No. 3/4, p 203-234, August 1977. 14 fig, 9 tab, 16 ref.

Descriptors: *Groundwater basins, *Hydrogeology, *Aquifers, *Africa, *On-site investigations, Groundwater, Water quality, On-site tests, Well data, Isotope studies, Cations, Water yields, Foreign research, Tritium, Groundwater recharge, Artesian aquifers, Pumping, Water levels, Natural recharge, Stable isotopes, Carbon radioisotopes.
Identifiers: *Orapa(Botswana).

Most students of the Kalahari thirstland have been in agreement that any groundwater encountered should be fossil as no rain recharge could occur in the vast sand-covered regions at present. The conclusion was challenged in the present study, during which intensive observations were made over 2 years on 27 boreholes and several shallow wells, situated in the sand-covered area of Orapa, in the northern Kalahari. Three aquifers are of importance in the region: a phreatic aquifer in the sandy Kalahari beds, a heterogeneous aquifer in the underlying highly jointed basalt, and a confined aquifer in the deeper-lying Cave sandstone. Rest level observations suggested that the phreatic Kalahari beds aquifer and the confined Cave sandstone aquifer are interconnected by occasional joints and solution zones in the intermediate basalt. The chemical composition of the various waters is in good agreement with the hydrological model. Tritium and 14C measurements showed clearly that the phreatic aquifer is recharged constantly by rain water. The confined Cave sandstone aquifer, on the other hand, is devoid of tritium and devoid of, or low in, 14C, indicating that the aquifer is not leaking, or it is leaking very slowly and water exchange with the upper aquifers is negligible. It is felt that intensive abstractions

from the aquifer may provide space for active recharge. Stable.isotopes determinations rule out any recharge from pans, lakes, or the river system in the north. Recharge occurs by direct rain infiltration, without any intermediate evaporation. (Humphreys-ISWS)
W78-00521

ANALYTIC SOLUTION FOR DRAWDOWN IN AN UNCONFINED-CONFINED RECTANGULAR AQUIFER,
Birmingham Univ. (England). Dept. of Mechanical Engineering.
Y. K. Chan, N. Mullineux, and J. R. Reed.
Journal of Hydrology, Vol. 34, No. 3/4, p 287-296, August 1977. 3 fig, 2 ref, 1 append.

Descriptors: *Drawdown, *Aquifers, *Mathematical models, *Equations, *Rainfall, Water wells, Pumping, Confined water, *Groundwater, Aquifer characteristics.
Identifiers: *Analytic solutions, *Unconfined-confined aquifers, Rectangular aquifers.

Analytical solutions for the drawdowns due to pumping from a rectangular, unconfined-confined aquifer subject to rainfall on the unconfined part were given. A solution with general rainfall and with time counted from the start of abstraction was shown to involve more extensive computation than is usually warranted. The amount of computation can be very considerably reduced by considering the rainfall to be periodic (either x-dependent or uniform) and by seeking the eventual periodic drawdown. Since the problem is linear, the drawdown due to a number of abstraction wells in the confined aquifer is merely the sum of the drawdowns due to each individually. (Visocky-ISWS)
W78-00522

OBSERVATION WELL RESPONSE TIME AND ITS EFFECT UPON AQUIFER TEST RESULTS,
Institute of Geological Sciences, London (England).
For primary bibliographic entry see Field 4B.
W78-00523

SIMILARITY SOLUTIONS FOR CONVECTION OF GROUNDWATER ADJACENT TO HORIZONTAL IMPERMEABLE SURFACES WITH AXISYMMETRIC TEMPERATURE DISTRIBUTION,
Hawaii Univ., Honolulu. Dept. of Mechanical Engineering.
P. Cheng, and W. C. Chau.
Water Resources Research, Vol. 13, No. 4, p 768-772, August 1977. 8 fig, 2 tab, 12 ref. NSF GI-38319, ERDA E(04-3)-1093.

Descriptors: *Groundwater movement, *Convection, *Water temperature, *Model studies, Mathematical models, Porous media, Groundwater, Heat transfer, Temperature, Heat flow, Heated water, Velocity, Permeability.
Identifiers: Groundwater convection, Free convection, *Heat dispersion, Thermal diffusivity.

The axisymmetric buoyancy-induced groundwater flow adjacent to horizontal impermeable surfaces, wall temperature being a power function of radius, was discussed in this paper. With the boundary layer simplifications, the governing nonlinear partial differential equations can be transformed into a coupled pair of nonlinear ordinary differential equations with two-point boundary conditions that can be integrated numerically by established techniques. Simple algebraic expressions for boundary layer thickness and heat transfer rate were obtained. Applications to free convective flow in a liquid-dominated geothermal system at high Rayleigh numbers were discussed. (Sims-ISWS)
W78-00532

MACROSCOPIC DISPERSION IN POROUS MEDIA: THE CONTROLLING FACTORS,
Alberta Univ., Edmonton. Dept. of Geology.
F. W. Schwartz.
Water Resources Research, Vol. 13, No. 4, p 743-752, August 1977. 7 fig, 10 ref, 1 append.

Descriptors: *Dispersion, *Porous media, *Model studies, Mathematical models, Hydraulic conductivity, Permeability, Porosity, Pores, Soil water, Soil water movement, Soils, Soil science, Groundwater, *Groundwater movement, Subsurface flow.
Identifiers: *Macroscopic dispersion.

One of the most important limitations to the application of modeling techniques for the analysis of mass transfer in groundwater systems is the difficulty in characterizing the dispersive character of natural systems. Although large quantities of experimental data exist for laboratory scale experiments, the handful of measurements which have been obtained from regional systems suggest that dispersion produced by large-scale porous medium nonidealities is considerably more important. The effects of macroscopic dispersion were simulated for uniform heterogeneous porous media under conditions of one-dimensional flow. The idealized media considered for detailed analysis consisted of low-permeability inclusions within a higher-permeability medium. When the inclusions are not arranged rather homogeneously within the region, a unique dispersivity value for the medium cannot be defined, and dispersivity changes as a function of space. The magnitude of dispersion is controlled by the contrast in hydraulic conductivity between the inclusions and the remainder of the medium, the number of inclusions, and the mode of aggregation. Generally, dispersivity was found to decrease as the conductivity contrast decreases and the structure of the medium is regularized. It will be possible to estimate the dispersivity of a medium by using stochastic analysis. Hypothetical porous media with characteristics similar to those of some actual medium will yield a range of dispersivity values. The basic data for the technique will be detailed statistical analysis of the mode of porous medium aggregation and the conductivity contrasts within the medium. (Sims-ISWS)
W78-00541

EVALUATION OF THE STORAGE OF DIFFUSE SOURCES OF SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 2J.
W78-00550

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS,
Georgia Inst. of Tech., Atlanta Environmental Resources Center.
For primary bibliographic entry see Field 2G.
W78-00564

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: APPLICATION OF LINEAR SYSTEMS ANALYSIS TO GROUND WATER EVALUATION STUDIES,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
C. T. Bathala, A. Ramachandra Rao, and J. A. Spooner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 886, Price codes: A07 in paper copy, A01 in microfiche. Technical Report No 91, February 1977. 128 p, 52 fig, 40 tab, 57 ref, 2 append. OWRT C-6106(5213)(2).

Descriptors: *Storage coefficient, *Transmissivity, *Water resources development, *Groundwater movement, Water tables, *Aquifers, Surface-groundwater relationships, Subsurface flow, Water storage, Groundwater reservoirs, Aquifer characteristics, Groundwater resources, City planning, Systems analysis.
Identifiers: *Linear Systems Analysis.

A generalized linear model is used to analyze groundwater flow in a stream-well-aquifer system. A procedure is developed to predict aquifer response by considering the cause and effect relationships of the groundwater flow system. In this procedure, historical records of pumping rates, groundwater levels and stream stages, and estimated storage coefficients are used as inputs. The utility of this procedure for analysis of regional aquifer systems is demonstrated by using both field and hypothetical data and satisfactory results are obtained. The procedure developed does not require predetermined transmissivity and storage coefficient values. The procedure is less subjective and appears to be more reliable than the type curve method for determination of the aquifer transmissivity and the storage coefficient from pumping test data. The causal relationships between precipitation, river stages and groundwater level were investigated by using the tests based on regression theory and the likelihood approach. Stochastic models for groundwater levels are developed after incorporating these causal relationships. This procedure was found to yield better stochastic models for groundwater levels.
W78-00570

MATHEMATICAL MODEL OF ULUOVA PLAIN, TURKEY - A TRAINING AND MANAGEMENT TOOL,
Belgrad Univ. (Yugoslavia).
For primary bibliographic entry see Field 2A.
W78-00692

TRANSIENT SPHERICAL FLOW TO A CAVITY WELL OF FINITE DIAMETER,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agricultural Engineering.
C. S. Jaiswal, H. S. Chauhan, and B. P. Ghildyal.
Ground Water, Vol. 15, No. 5, p 372-376, September-October 1977. 4 fig, 3 tab, 12 ref.

Descriptors: *Flow, *Groundwater movement, *Wells, Transmissivity, Storage coefficient, Aquifers, Hydrology, Groundwater, Mathematical studies, Analysis.
Identifiers: *Nonpenetrating wells, Aquifer depth ratio, Small duration test, Transient spherical flow.

The system of flow into a nonpenetrating well with hemispherical bottom of finite radius in a finite deep artesian aquifer of infinite radial extent was analyzed. The solution was obtained in terms of error function. A method was suggested for determination of transmissivity, storage coefficient, and depth of aquifer from pump test data of such wells discharging at constant rate. For small values of radial distance to aquifer depth ratio and for small duration test, only a few were required in the present solution as compared to the solution of Hantush developed for such wells. (Lee-ISWS)
W78-00693

REVIEW OF C.E. JACOB'S DOUBLET WELL,
For primary bibliographic entry see Field 8B.
W78-00720

MAPS SHOWING GROUND-WATER CONDITIONS IN THE NORTHERN PART OF THE CHINLE AREA, APACHE COUNTY, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.

W78-00802

MAPS SHOWING GROUND-WATER CONDITIONS IN THE MONUMENT VALLEY AND NORTHERN PART OF THE BLACK MESA AREAS, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00803

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SOUTHERN PART OF THE BLACK MESA AREA, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00804

JARRETTSVILLE QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00805

BEL AIR QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00806

GROUND-WATER INVESTIGATION AT THE ALLUVIAL FAN OF THE SOUTH FORK EAGLE RIVER, ANCHORAGE, ALASKA - RESULTS OF TEST DRILLING, 1976,
Geological Survey, Anchorage, AL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00810

GROUND-WATER RESOURCES OF THE ALLUVIAL AQUIFERS IN NORTHEASTERN LARIMER COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00811

CHEMICAL, ISOTOPIC, AND GAS COMPOSITIONS OF SELECTED THERMAL SPRINGS IN ARIZONA, NEW MEXICO, AND UTAH,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00815

RELATION BETWEEN EARTHQUAKES, WEATHER, AND SOIL TILT,
Geological Survey, Reston, VA. Geologic Div.
For primary bibliographic entry see Field 7B.
W78-00823

2G. Water In Soils

DEPENDENCE OF TRANSPIRATION AND DIFFUSION PRESSURE IN PLANTS ON SOIL MOISTURE CONTENT AND POTENTIAL, (IN BULGARIAN),
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Hydrotechnics and Ameliorations.
For primary bibliographic entry see Field 2D.
W78-00515

AN EXPERIMENT IN RECLAIMING THE FLOODPLAIN LAND, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
T. V. Afanas'Eva, and B. V. Sheremet.
Vestn Mosk Univ. Sek Vi Biol Pochvoved 30(1), p 87-98, 1975.

Descriptors: *Flood plains, Land reclamation, *Soil reclamation, Vegetation.
Identifiers: *USSR(Ob flood plain), Tomsk region.

Work was carried out on the territory of the Ob floodplain in the southern part of the Tomsk region (USSR). A scheme of soil reclamation groups is proposed and recommendations on rational land use are given. The importance of forming the group on the basis of correlation of their soil components, vegetable cover and relief is emphasized. --Copyright 1976, Biological Abstracts, Inc.
W78-00519

NITRATE-NITROGEN AND CHLORIDE MOVEMENT THROUGH UNDISTURBED FIELD SOIL,
Alabama A and M Univ., Normal.
For primary bibliographic entry see Field 5B.
W78-00520

A POROUS CUP SOIL-WATER SAMPLER WITH VOLUME CONTROL,
Newfoundland Forest Research Centre, St. John's.
T. L. Chow.
Soil Science, Vol. 124, No. 3, p 173-176, 1977. 2 fig, 4 ref.

Descriptors: *Soil water, *Water sampling, *Instrumentation, Equipment, Design, Volume, Mercury, Negative pressure, Soil moisture meters, Sampling.
Identifiers: *Porous cup, *Ceramic, *Vacuum.

The design, construction, and application of an inexpensive, mercury-pressure control device, designed for use in combination with the constant vacuum, porous cup, soil-solution sampler, were given. The unit has the ability to shut off the constant pressure source when a predetermined volume of water has been collected. The newly designed assembly inherits all the advantages of the original design, and it eliminates the contamination resulting from overfilling of sample bottles and the influence of soil volume. (Visocky-ISWS)
W78-00529

A COMPARISON OF EXACT AND NUMERICAL SOLUTIONS OF THE DIFFUSION EQUATION NEAR SINGULARITIES,
Universite Scientifique et Medicale de Grenoble (France). Inst. de Mecanique.
M. Vauclin, R. Haverkamp, J. Touma, G. Vachaud, and J. -Y. Parlange.
Soil Science, Vol. 124, No. 3, p 181-185, 1977. 5 fig, 8 ref.

Descriptors: *Soil water movement, *Diffusion, *Equations, *Mathematical models, Numerical analysis, Mathematical studies, Mathematics, Model studies, Soil water, Flow.
Identifiers: Singularities.

Discontinuous boundary or initial conditions introduce singularities in the solution of the diffusion equation. Numerical techniques cannot describe such singularities exactly. Hence, it is important to be able to evaluate a priori the error of the numerical approximation near singularities. It was proposed that an exact solution with both spatial and temporal singularities can be used to assess the precision of the numerical approach. The assessment carried out for a particular case can be used to give an indication of the validity of the numerical technique for more general problems when no exact solution is available. (Visocky-ISWS)
W78-00530

EXTENSION OF THE SIMILARITY HYPOTHESIS USED FOR MODELING THE SOIL WATER CHARACTERISTICS,
Colorado State Univ., Fort Collins. Engineering Research Center.
Y. Mualem.
Water Resources Research, Vol. 13, No. 4, p 773-780, August 1977. 13 fig, 14 ref. NSF ENG76-11542.

Descriptors: *Soil water, *Hysteresis, *Soil moisture, *Model studies, Mathematical models, Soils, Wetting, Drying, Curves, Soil physics, Soil physic properties, Soil science.

Two independent domains models were derived by using an extended similarity hypothesis, according to which the pore water distribution function is interpreted to be f(r,rho) = h(r)h(rho). When the hypothesis was applied to the Neel diagram and the Mualem diagram, it yielded 2 different models which permit prediction of the hysteretical relationship from only 1 branch of the main hysteresis loop. The models yield an extremely simple formula for the relationship between the boundary drying and wetting curves. Moreover, a universal nondimensional hysteresis was derived for all soils. Comparison with experiments showed that the model which used the Neel diagram fails to reproduce a reasonable shape of the hysteresis curves. However, much better results were achieved by the second model, which used the Mualem diagram. In some cases the predicted curves were in very good agreement with the observed ones. For soils in which blockage against air entry plays a significant role, the model is less efficient as a predictive tool. It yields poor results in the region of high water content, while the predicted curves are very close to the measured ones in the range of low water content. (Sims-ISWS)
W78-00533

INFILTRATION UNDER A PULSED WATER APPLICATION: 1. THE NATURE OF THE FLOW SYSTEM,
Technion - Israel Inst. of Tech., Haifa. Faculty of Agricultural Engineering; and Technion - Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
B. Zur, and D. Savaldi.
Soil Science, Vol. 124, No. 3, p 127-134, September 1977. 5 fig, 2 tab, 3 ref.

Descriptors: *Soil moisture, *Infiltration, *Rates of application, Laboratory tests, Model studies, Mathematical models, Irrigation, Depth, Soil water, *Soil water movement, Soil science.
Identifiers: *Pulsed water application.

The induced periodic changes in the volumetric soil water content, theta, at the various soil depths and the analogy of the soil water regime during infiltration under a pulsed water application to a wave propagation phenomenon was formulated and experimentally tested. The time changes in theta at a number of depths in soil columns receiving water under 2 pulsation regimes were well represented by a Fourier series. The computed amplitudes of the theta time changes were damped exponentially with depth, and the computed phase shifts increased linearly with depth, as expected by theory. A similar behavior was observed with the experimentally determined amplitudes. Under the higher instantaneous application rate and the time-averaged application rate, R sub av, values, however, no damping of the amplitude was observed at a soil depth range of 0.5-3.5 cm. Representative damping depths of 4-5 cm and 9-11 cm were obtained for the soil columns receiving water at R sub av values of 1.0 mm/hr and 5.0 mm/hr, respectively, for a period of 60 min. When periodic water pulses are applied at the soil surface, the induced time fluctuations in theta and q are exponentially damped with depth. Below the damping depth, the water pulses applied at the soil

surface are stretched almost evenly throughout the period. As a result, theta is constant with time and depth at a value determined by R sub av. (Sims-ISWS)
W78-00535

SOIL AIR PRESSURE UNDER SUCCESSIVE BORDER IRRIGATIONS AND SIMULATED RAIN,
Agricultural Research Service, St. Paul, MN.
D. R. Linden, R. M. Dixon, and J. C. Guitjens.
Soil Science, Vol. 124, No. 3, p 135-139, September 1977. 3 fig, 8 ref.

Descriptors: *Infiltration, *Irrigation, *Soil pressure, *Pressure head, On-site investigations, Soil physics, Soil water, Soil water movement, Pressure, Air, Air-earth interfaces, Agriculture, Soil science, Irrigation.

Soil air pressure and surface water head were measured at a single field site during eight irrigations of alfalfa during the 1972 growing season. Soil air pressure, h sub a, and surface water head, h sub w, were presented as functions of elapsed irrigation time to illustrate the short-term and seasonal variation of the parameters. It was shown that h sub a varies directly with h sub w, and that the head imbalance, h sub a - h sub w, increased at a decreasing rate during each irrigation, until it reached a plateau ranging between 4 and 7 cm, and, thereafter, it remained nearly constant until headgate closure. Small differences in h sub a - h sub w between irrigations may have had a significant effect on infiltration because total field application decreased as h sub a - h sub w increased. Soil air pressure increased under simulated rain when ponding began where airflow was restricted by an impermeable barrier at a 20-cm depth. The air pressure increase had little apparent effect on infiltration. Soil air pressure created and maintained from the onset of infiltration reduced infiltration by about 20%. (Sims-ISWS)
W78-00536

HYDROPHYSICAL REGIME OF FOREST SOILS DEPENDING ON FOREST CULTIVATION PRACTICES, (IN BELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Tsentralny Botanichny Sad.
K. M. Yewsiyevich, and H. U. Myerkul'.
Vyestsi Akad Navuk BSSR Syer Biyal Navuk 2, p 55-58, 1975.

Descriptors: *Forest soils, *Cultivation, *Fertilizers, Soil texture, *Soil density, *Moisture content, *Porosity, *Saturated soils, Forest management, Pine trees, *Soil moisture.
Identifiers: Cowberry.

The effect of cultivation and organic and mineral fertilizers on the water content and physical properties of coarse-textured soils of cowberry-pine forests was studied. The favorable effect was reflected in a decrease of soil bulk density and the increase of its porosity, moisture capacity and degree of saturation.--Copyright 1976, Biological Abstracts, Inc.
W78-00540

MACROSCOPIC DISPERSION IN POROUS MEDIA: THE CONTROLLING FACTORS,
Alberta Univ., Edmonton. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W78-00541

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VII - AN INVESTIGATION OF THE VERTICAL AND HORIZONTAL HYDRAULIC CONDUCTIVITIES OF DENSE BASE COURSE AGGREGATES,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W78-00544

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS,
Georgia Inst. of Tech., Atlanta Environmental Resources Center.
J. H. Howard, III.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 993, Price codes: A02 in paper copy, A01 in microfiche. ERC Report 0473, (1977). 20 p, 1 fig, 13 tab. OWRT B-010-GA(2). 14-01-0001-1488.

Descriptors: Groundwater, Infiltration, *Permeability, Soil profiles, *Saprolites, Groundwater movement, *Weathering, Residual soils, *Crystalline rocks, Georgia, Soil horizons, Kaolinite, Iron oxides, Aluminum, Silicon, Silicates, Granites.
Identifiers: *Soil permeability, *Georgia Piedmont.

Geochemical, mineralogical, and textural studies of weathering mantles of crystalline rocks of the Georgia Piedmont show that a low-permeability horizon, which develops during the weathering of some rock types and which impedes infiltration of water from the surface, is formed by the accumulation of kaolinite and oxides of iron, aluminum, and silicon. Three types of hardpan were found, but only one is extensive in its impedance of water infiltration. This is a dense layer, often several feet thick and composed of accumulations of hematite, kaolinite, and probably silica, which forms in the weathering mantle of granitic and gnessic rocks. It may be possible to disrupt this low-permeability layer by application of organic reducing agents, thus increasing water infiltration for recharge of the underlying water table. The geologic terrane is of greatest importance in the development of the low-permeability horizons, which develop on rocks of fairly uniform structure and texture: plutonic granites and granite gneisses. Low permeability zones do not develop on dense fine grained rocks or metamorphic rocks with inclined foliation. Favorable well sites can be selected on the basis of a knowledge of the areal geology, so that areas with likelihood of hardpan development, and thus low water infiltration, can be avoided.
W78-00564

EFFECTS OF SLUDGE APPLICATIONS ON SOIL WATER AND VEGETATION IN A NORTHERN HARDWOOD FOREST IN NEW ENGLAND,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W78-00567

CHANGES IN PORE-SIZE DISTRIBUTION CAUSED BY SOIL PACKING THROUGH PRESSURE, (IN SLOVENIAN),
Ljublijana, Univ. (Yugoslavia). Faculty of Biotechnology.
T. Stupica.
Zb Bioteh Fak Univ Ljublj Kmetijstvo 23, p 35-56. 1974.

Descriptors: Soils, *Soil pressure, *Distribution, *Soil moisture.
Identifiers: *Pore size(Soils), *Soil packing.

Soil is exposed to heavy pressure by heavy combines and cultivation machines. The difference of soil packing is due to the difference in moisture and weight of the soil as well as the pressure applied to it. Three types of soil were studied with regard to soil packing by changing soil moisture from pF 1.5 to 2.7 and pressure from 0.5 to 2.0 kp/cm2. The study of pore-size-distribution change, carried out on field samples of the same types of soil taken from wheeltraits after the harvest, revealed the smallest changes on sandy soil and the greatest ones on heavy clay soil. Along with these changes in samples from wheeltraits an increase of bound (hygroscopic) water was recorded.--Copyright 1976, Biological Abstracts, Inc.
W78-00622

DRAINAGE FLUX IN PERMEABLE SOIL UNDERLAIN BY A COARSE-TEXTURED LAYER,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
B. E. Clothier, D. R. Scotter, and J. P. Kerr.
Soil Science Society of America Journal, Vol 41, No 4, p 671-676, July-August 1977. 9 fig, 13 ref.

Descriptors: *Hysteresis, *Lysimeters, *Model studies, Tensiometers, Drainage, Hydraulics, Soil science, Equations, Mathematical studies, Water storage, Water balance, Hydraulic conductivity.
Identifiers: *Neutron probe, Pressure potential, Drainage flux.

Drainage from a permeable soil underlain by a coarse-textured layer was investigated. Simplified theory was used to develop a model relating the drainage flux at the base of the soil to the water storage in the soil. Despite significant hysteresis in the water retentivity curve of the overlying soil and in the hydraulic conductivity-pressure potential relationship of the coarse layer, hysteresis had little effect on the storage-flux relation. The model successfully simulated field drainage as measured by a lysimeter and field profile water storage as found by neutron moisture probe measurements. The decline in the drainage flux after the profile has been wetted depends on the depth and retentivity of the soil and the hydraulic conductivity of the underlying coarse layer. To use the model, only simple field measurements to find the storage-flux relationship are needed. (Lee-ISWS)
W78-00675

KINETICS OF SALT RELEASE FROM A SALINE SOIL,
Utah State Univ., Logan. Dept. of Soil Science and Biometeorology.
J. J. Jurinak, J. C. Whitmore, and R. J. Wagenet.
Soil Science Society of America Journal, Vol 41, No 4, p 721-724, July - August 1977. 5 fig, 8 ref. USDI/BLM 52500-CT5-16.

Descriptors: *Saline soils, *Utah, *Water quality, *Soil chemical properties, *Leaching, *Salinity, Diffusion, Analytical techniques, Percolation, Soil moisture, Soil water, Soil water movement, Physical properties, Properties, Saline water, *Kinetics, *Salts.
Identifiers: *Mineral dissolution(Soils), *Salt release, Soluble soil minerals, Diffuse sources of salinity, Non-point sources of salinity.

The kinetics of salt release from simulated saline sediments was studied to ascertain the potential of sediments as a diffuse source of salinity. Two rate equations were derived, both based on the premise that dissolution is a diffusion controlled process. The equations were ln(1-C/C sub s) = -kt and C = k't(1/2), where c is the concentration at any point in the bulk solution, c sub s is the equilibrium concentration of the soluble soil minerals, t is time, k is the first-order rate constant, and k' a proportionality constant. Kinetic data were obtained from a saline typic torriorthent soil derived from Mancos shale in the Price river Basin, Utah. During the initial 72 hours of reaction, dissolution can be described by three diffusion controlled reactions. Increasing particle size decreased the rate of reaction. Both derived equations were equally effective in describing salt release. (Henley-ISWS)
W78-00676

EFFECT OF SOIL STRENGTH ON SOIL DETACHMENT DUE TO RAINDROP IMPACT,
Minnesota Univ., St. Paul.
R. M. Crusé, and W. E. Larson.
Soil Science Society of America Journal, Vol 41, No 4, p 777-781, July-August 1977. 7 fig, 3 tab, 18 ref.

Descriptors: *Raindrops, *Soil strength, *Impact(Rainfall), Erosion, Shear strength, Sheet erosion, Bulk density, Soils, Mathematical studies, Equations.
Identifiers: *Soil detachment, Soil splash, Polyvinyl alcohol, Matric potential.

Soil strength was altered in 3 different ways to test the hypothesis that soil splash from raindrop impact is related to soil strength parameters. Bulk density changes were used to alter direct solid particle-to-particle contact; changes in matric potential were used to change contact relationships between solid particles and liquid films; and additions of polyvinyl alcohol (PVA) provided a direct bonding mechanism between solid particles. The amount of soil detached by a single simulated 4.8-mm raindrop faling from a height of 177 cm was correlated closely with the shearing strength as measred by a triaxial compression test. (Lee-ISWS)
W78-00677

CHISELING INFLUENCES ON SOIL HYDRAULIC PROPERTIES,
Agricultural Research Service, Pendleton, OR. Columbia Plateau Conservation Research Center.
R. R. Allmaras, R. W. Rickman, L. G. Ekin, and B. A. Kimball.
Soil Science Society of America Journal, Vol 41, No 4, p 796-803, July-August 1977. 7 fig, 2 tab, 26 ref.

Descriptors: *Chiselling, *Oregon, *Washington, *Soil water, *Infiltration, *Hydraulic conductivity, Cultivation, Soil properties, Silts, Loam, Cation exchange, Clays, Organic matter, On-site investigations, Bulk density, Depth, Moisture content, Drainage, Evaporation, Hydraulic properties.
Identifiers: Soil water desorption.

Hydraulic conductivity (K) and soil water desorption characteristic (SWDC) were field measured in the 120-cm soil profile of a Walla Walla (Mesic type Haploxeroll) silt loam before and after chiseling 43-cm deep. The test Walla Walla soil is layered. Chiseling affected both the SWDC and K in the upper 30 cm, especially at 10 and 20-cm depths, but had no influence on the measurements at increased, especially in the -50 to -300 mbar range. Failure of chiseling to improve water relations in the mild duripan extending from 30 to 45 cm suggests the need for addition of plant residue or chemical amendments into the chisel slots. Water contents and hydraulic heads during drainage showed that chiseling could reduce evaporation by reducing water content and diffusivity. Overall soil profile hydraulic resistances showed relative average K up to 15 times greater as a resuult of chiseling 43 cm deep, but nearly similar accelerated internal drainages were projected for simulated chiseling to 25-cm depth vs. chiseling to 43 cm. (Visocky-ISWS)
W78-00678

COMPARISON OF METHODS OF CALIBRATION OF A NEUTRON PROBE BY GRAVIMETRY OR NEUTRON-CAPTURE MODEL,
Grenoble-1 Univ. (France). Inst. de Mecanique.
G. Vachaud, J. M. Royer, and J. D. Cooper.
Journal of Hydrology, Vol 34, No 3/4, p 343-356, August 1977. 3 fig, 1 tab, 21 ref.

Descriptors: *Soil moisture meters, *Soil water, *Calibrations, *Analytical techniques, *Nuclear moisture meters, Instrumentation, Chemical properties, Nuclear meters, Gravimetry, Soil analysis, Mathematical studies, Soil properties, Soil moisture, Gravimetric analysis, Soil tests, Moisture content, Methodology.
Identifiers: *Neutron probe, *Neutron-capture technique, *Gravimetric calibration technique, Calibration curves.

Presented was a systematic analysis of 2 methods used for determining calibration curves of neutron probes. The uncertainties resulting from the use of the gravimetric method, with a linear correlation between count rates and water content of soil samples, were considered first. Particular care was given to the determination of errors in the values of water content and count rates and to the difficulties arising from the choice of the correlation technique. The neutron-calibration curve of the soil also was obtained with a technique based on the determination of neutron thermal absorption and diffusion constants. The importance of errors associated with the method was also analyzed. Different field examples then were presented. It appears that the neutron-capture technique should be particularly well suited for determining the calibration curve of clay soils or heterogeneous materials for which the gravimetric calibration technique cannot be applied with confidence. On the other hand, it also was shown that for a soil with a very well-defined gravimetric calibration curve, the neutron-capture technique gives results still at least as good as with the former method. (Henley-ISWS)
W78-00679

COLORIMETRIC METHOD OF DETERMINATION OF AMIBEN IN AIR, WATER AND SOIL,
Kiev Inst. for the Advanced Training of Physicians (USSR).
For primary bibliographic entry see Field 5A.
W78-00700

STEADY INFILTRATION FROM A DITCH: THEORY AND EXPERIMENT,
Karadeniz Teknik Univ., Trabzon (Turkey). Dept. of Civil Engineering and Architecture.
For primary bibliographic entry see Field 4A.
W78-00708

ANALYSIS OF THE SATURATED-UNSATURATED HYDRAULIC CONDUCTIVITY IN A MIXED SODIUM-CALCIUM SOIL SYSTEM,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel).
D. Russo, and E. Bresler.
Soil Science Society of America Journal, Vol. 41, No. 4, p 706-710, July-August 1977. 4 fig, 23 ref.

Descriptors: *Hydraulic conductivity, *Ions, *Sodium, *Calcium, Soils, Soil water movement, Montmorillonite, Pore pressure, Pores, Porosity, Soil properties, Model studies, Mathematical models, Soil science.
Identifiers: Soil solution concentration, Tactoids, Pore size distribution.

A model was developed to diagnose the effects of Na/sq rt of Ca ratios and soil solution concentrations on the hydraulic conductivity for an unsaturated soil. The model takes into account the porous nature and the electrical properties of the soil. Interactions between ions in the exchange phase and in the liquid phase were expressed quantitatively by the diffuse double-layer theory. Experimental data on the effect of soil solution and soil water pressure on clay platelet orgainzation and structure were considered in the model. A test was made on the sensitivity of the model to variations in the various input parameters. The model was found to be sensitive to the relationship between the number of platelets per clay particle and the ESP of the soil. The diagnostic model was compared with experimental data for 3 soils of different texture. The model approximates the hydraulic conductivity function for many practical combinations of Na/sq rt of Ca ratios and soil solution concentrations for the ranges of soil water content in which most of the water flow occurs. (Sims-ISWS)
W78-00709

EFFECT OF MIXED NA-CA SOLUTIONS ON THE HYDRAULIC PROPERTIES OF UNSATURATED SOILS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel).
D. Russo, and E. Bresler.
Soil Science Society of America Journal, Vol. 41, No. 4, p 713-717, July-August 1977. 6 fig, 1 tab, 20 ref.

Descriptors: *Sodium, *Calcium, *Soil properties, *Hydraulic properties, Soil water, Unsaturated flow, Loam, Soils, Ion exchange, Diffusivity, Hydraulic conductivity, Moisture content, Laboratory tests, Retention.
Identifiers: Diffuse layer theory, Soil columns.

The effects of mixed Na-Ca solutions on soil water diffusivity and unsaturated hydraulic conductivity were tested for a loamy soil from Gilat, Israel. Soil water diffusivity functions, D(theta), were determined by the horizontal infiltration method. Unsaturated hydraulic conductivity functions, K(theta), were determined both directly (by vertical infiltration for suction heads of 0-50 cm H2O) and indirectly (from diffusivity functions and soil water retention curves). Prior to determinations, soil samples were equilibrated with solutions containing a given concentration and composition of Ca and Na. The results showed that D(theta) and K(theta) are independent of solution concentrations in a Ca-saturated system. In mixed Na-Ca systems, hydraulic conductivity and soil water diffusivity functions are highly dependent on the composition and concentration of the soil solution, in addition to their dependence on soil water content, theta. For any given theta, both K(theta) and D(theta) decrease as either soil solution concentration decreases or the sodium fraction in the soil solution increases. The negative effect of a combination of high Na-to-Ca ratio and low soil solution concentration on K(theta) is related directly to the degree of water saturation of the soil. Low values of theta can compensate for the negative effects of high Na-to-Ca ratio and low solution concentration. (Visocky-ISWS)
W78-00710

DISPERSION ANALYSIS OF THE EFFECT OF ECOLOGICAL CONDITIONS ON THE VARIABILITY OF THE WATER CONTENT IN MEADOW PLANT LEAVES, (IN RUSSIAN),
Leningrad State Univ. (USSR).
For primary bibliographic entry see Field 2I.
W78-00744

VALIDITY OF DARCY'S LAW DURING THE HORIZONTAL INFILTRATION IN A CLAY SOIL THAT IS NOT FULLY SATURATED BY WATER, (IN DUTCH),
H. Verplancke, and M. De Boodt.
Meded Fac Landbouwwet Rijksuniv Gent. 39(1), p 134-147, 1974.

Descriptors: *Darcys law, *Infiltration, *Clays, Soils, *Soil water movement, Diffusion.
Identifiers: Diffusion coefficient.

The basic hypotheses used in the theoretical solution of problems concerning the infiltration of water in a dry clay were verified, particularly the generalized law of Darcy. A method of analysis to derive the diffusion coefficient from the evolution of water profiles was thus developed.--Copyright 1975, Biological Abstracts, Inc.
W78-00759

THE WATER REGIME OF SANDS AND SANDY SOILS ON THE RIGHT SIDE OF THE CALMATUI RIVER, (IN ROMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
G. Sandu.
An Inst Stud Cercet Pedol. 40, p 99-114, 1972.

Descriptors: *Sands, Chernozems, Sampling, Soil physical properties, Soil chemical properties, *Soil water movement, Soil profiles, *Soil moisture, *Moisture content, Rainfall.
Identifiers: *Romania(Calmatui River).

The water regime of the slightly humic dune sand, slightly humic slope sand and interduen chernozem-like soil at Rusetu-Margineanca (Romania) was studied. The soil (15 cm-5 m deep) was sampled twice monthly (on 1st and 15th days). The physical hydrologic and chemical characteristics of the sand and sandy soils which play an important role in water movement and accumulation in the profile are described. The water regime was analyzed in close connection with the wetting sources, particularly with rainfall, condensation water and humidity in the capillary fringe (for interdune chernozem-like soil). The analytical moisture data are presented in the form of chronoisoplets.--Copyright 1975, Biological Abstracts, Inc.
W78-00775

RELATION BETWEEN EARTHQUAKES, WEATHER, AND SOIL TILT,
Geological Survey, Reston, VA. Geologic Div.
For primary bibliographic entry see Field 7B.
W78-00823

2H. Lakes

COMPUTATIONAL HYDRAULICS: AN ALTERNATIVE VIEW,
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
For primary bibliographic entry see Field 5B.
W78-00524

THE THERMAL STRUCTURE OF SMALL LAKES: THE INFLUENCE OF A MODIFIED WIND SPEED,
Salford Univ. (England). Dept. of Civil Engineering.
B. Henderson-Sellers.
Water Resources Research, Vol. 13, No. 4, p 791-793, August 1977. 7 fig, 9 ref.

Descriptors: *Lakes, *Thermal stratification, *Water temperature, *Model studies, Mathematical models, Winds, Effects, Foreign countries, Reservoirs, Foreign research, Shallow waters, Stratification, Temperature, Thermal properties, Limnology.
Identifiers: *Farmoor Reservoir(England).

The thermal structure of a lake is determined primarily by the wind shear, which induces turbulence in the lake. In the case of a lake of small areal extent, numerical models employing observed or climatological functions for the wind speed give unacceptable results. It was shown that if the wind speed is modified by a function of the lake surface area, then the annual stratification of a small lake can be described realistically. The techniques was illustrated for the case of Farmoor Reservoir in England. (Sims-ISWS)
W78-00534

PRECIPITATION (RADAR) PROJECT OF THE IFYGL LAKE METEOROLOGY PROGRAM,
Center for the Environment and Man, Inc., Hartford, CT.
For primary bibliographic entry see Field 2B.
W78-00546

HYDROLOGIC MODELING OF THE DEVILS LAKE BASIN WATERSHEDS,
North Dakota Water Resources Research Inst., Fargo.
For primary bibliographic entry see Field 4D.
W78-00569

INLAND LAKE PROTECTION IN NORTHERN MICHIGAN (NORTHERN MICHIGAN ENVIRONMENTAL RESEARCH PROGRAM EDUCATIONAL SERIES: PUBLICATION NO. 1),
Michigan Univ., Ann Arbor, Biological Station.
For primary bibliographic entry see Field 6G.
W78-00716

MICRO- AND MESOBENTHOS OF THE DNIEPER IN THE AREA OF THE FUTURE KANEV WATER STORAGE BASIN, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
V. V. Gurvich.
Gidrobiol ZZh. 10(4), p 24-29, 1974.

Descriptors: *Benthos, *Microorganisms, Copepods, Crustaceans, Nematods, Diptera.
Identifiers: Harpacticoida, Oligochaeta, Ostracoda, *Testacea, *USSR(Kanev water storage basin), *Dnieper River.

In the Dnieper (USSR) area under study there were found: Testacea (Rhizopoda), 44 spp.; Nematoda, 26 spp.; Oligochaeta, 17 spp.; Cladocera, 15 spp.; Copepoda, 8 spp.; Harpacticoida, 3 spp.; Ostracoda, 2 spp. and Chironomidae larvae (the 2nd-3rd stages of development); 22 spp. The species composition and quantitative development of micro- and mesobenthos are dependent on the sediment character. Rhizopoda dominate in the microbenthos; Oligochaeta and Cladocera in the mesobenthos. For the 1st 3-4 yr of existence of the water storage basin the benthos microfauna will be diverse and ecologically heterogeneous. After 6-19 yr, micro- and mesobenthos will be represented by a small number of pelophilic and psammopelophilic cenoses.--Copyright 1975, Biological Abstracts, Inc.
W78-00748

THOU SHALT NOT FILL PUBLIC WATERS WITHOUT PUBLIC PERMISSION - WASHINGTON'S LAKE CHELAN DECISION,
Washington Univ., Seattle. School of Law.
For primary bibliographic entry see Field 6E.
W78-00788

CLASSIFICATION OF THE HYDROLOGIC SETTINGS OF LAKES IN THE NORTH CENTRAL UNITED STATES,
Geological Survey, Denver, CO. Water Resources Div.
T. C. Winter.
Water Resources Research, Vol 13, No 4, p 753-767, August 1977. 6 fig, 3 tab, 38 ref.

Descriptors: *Lakes, *Classification, *Hydrology, *Water balance, *Mapping, Statistical methods, Precipitation(Atmospheric), Evaporation, Water quality, Inflow, Surface waters, Groundwater, Discharge(Water), Flow characteristics, Drainage area, Runoff.
Identifiers: *North-central United States, *Lake hydrology.

This study is a first attempt to identify and map the areal distribution of independent variables that can be used in developing a general hydrologic classification of lakes. Lake hydrology consists of the study of the interchange of a lake with atmospheric water, surface water, and groundwater. Data on the hydrologic settings of 150 randomly selected lakes in the north central United States were analyzed by principal component analysis. In this study the original variables that load high on each of the principal components (the calculated statistical axes) are statistically independent and within each component are clearly related to each other. Precipitation-evaporation balance (atmospheric water) and the water quality variables have high factor loadings on the first principal component. Highest loadings on the second principal component are for streamflow in and out of the lakes. Principal components 3 and 4 are characterized by geologic and groundwater flow characteristics. The drainage basin area/lake area ratio, representing overland runoff, has the highest loading on the fifth principal component. The stability of the principal components was tested by randomly splitting the data and comparing a principal component analysis of each subsample. This showed the first two principal components to be the most stable. The components described by the groundwater variables are less stable. (Woodard-USGS)
W78-00808

DIATOM ALGAE OF PELAGIC AND COASTAL ZONES, BENTHONIC AND SILT LAYERS OF LAKES OF THE NARACHANSK GROUP IN THE BELORUSSIAN SSR, (IN RUSSIAN),
Belorussian State Univ., Minsk (USSR).
T. M. Mikheeva, and K. G. Khursevich.
Bot Zh (Leningra) 59(11), p 1657-1666, 1974.

Descriptors: *Algae, *Diatoms, Lakes, Coasts, Silts, Aquatic plants, Aquatic animals.
Identifiers: Asterionella-formosa, Belorussian-SSR, Cyclotella-comta, Cymbella-ventricosa, Fragilaria-crotonensis, Melosira-ambigua, Melosira-granulata, Tabellaria-fenestrata, *USSR(Narachansk lakes).

The results of quantitative studies (1968-71) on diatoms of pelagic areas, coastal zones, benthonic and silt layers in the lakes of the Narachansk group, Belorussia (USSR) are discussed. The seasons of maximum abundance diatoms were different in various waters. The species were predominantly freshwater species in all areas studied. The dominant species were Cyclotella comta, Asterionella formosa, Tabellariaa fenestrata, Cymbella ventricosa, Fragilaria crotonensis, Melosira granulata and M. ambigua. Many diatoms such as M. ambigua were indifferent to pH. A significant percentage (29.5-38.4%) of the diatom flora such as M. granlata and C. comta were alkaliphilic.
W78-00844

A REVIEW OF STUDIES ON THE BIOLOGICAL PRODUCTIVITY OF BENTHIC ANIMALS IN FRESHWATER RESERVOIRS OF THE SOVIET UNION (SOME INTERNATIONAL BIOLOGICAL PROGRAM RESULTS), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Inst.
A. F. Alimov.
Izv Akad SSSR Ser Biol. 1, p 94-103, 1975.

Descriptors: *Benthic fauna, *Productivity, Reviews, Biomass, Benthos, Seasonal, *Reservoirs, Aquatic animals.
Identifiers: *USSR(International Biological Programs).

Investigations were made into the biological productivity of benthic animals in the USSR following the IBP (International Biological Program) program. A broad (from N-S) biomass (B) increase and benthos production (P) in reservoirs were observed. Seasonal and long term variations of the biomass of benthic animals, their food, the values of the P/B coefficient in reservoirs of different trophic states and geographical positions are discussed. The energy balance of benthic animals, the biocenosis and the entire benthic system in various reservoirs are discussed.--Copyright 1975, Biological Abstracts, Inc.
W78-00845

THE MEDUSA CRASPEDACUSTA SOWERBYI LANKESTER (LIMNOMEDUSAE) IN LAKE SIRIO (IVREA, TORINO), (IN ITALIAN),
G. Badino, and E. Lodi.
Boll Pesca Piscic Indrobiol. 27(2), p 293-296, 1972.

Descriptors: Lakes, Growth rates.

Identifiers: *Craspedacusta-sowerbyi, Medusae, Torino, *Monomyctic lakes, *Lake Sirio(Italy).

C. sowerbyi (Limnomedusae) from Sirio Lake (Ivrea, Italy), shows an explosive growth of medusae, from early Aug. until the end of Oct. This phenomenon does not recur every year. Sirio Lake, which is monomyctic, with an overturn in Feb. and March, is not significantly polluted. All the specimens collected during 1970-72 were females.--Copyright 1975, Biological Abstracts, Inc.
W78-00846

SANTO PARMENSE LAKE (NORTHERN APENNINES): PHYSIOGRAPHY AND DYNAMICS OF THE MESOPLANKTONIC POPULATION, (IN ITALIAN),
Parma Univ. (Italy). Lab. di Ecologia.
A. Moroni, I. Ferrari, and O. Rossi.
Boll Pesca Piscic Idrobiol. 28(1), p 5-44, 1973.

Descriptors: Lakes, *Zooplankton, Sampling, *Distribution, *Seasonal, *Vertical stratification, *Succession, Daphnia, Geomorphology.
Identifiers: Asplanchna-priodonta, Daphnia-longispina, Eudiaptomus-intermedius, Kellicottia-longispina, Keratella-cochlearis, *Santo-parmense Lake(Italy).

Santo Parmense Lake lies at 1507 m above sea level in the high Parma Valley (North Apennines, Italy). The pelagic zooplankton consists principally of: Eudiaptomus intermedius (Copepoda, Calanoida), Daphnia longispina (Cladocera), Asplanchna priodonta, Kellicottia longispina and Keratella cochlearis (Rotifera). The life cycle of E. intermedius, which is a univoltine species, was analyzed. The density data of the zooplankton collected at different stations and layers in Santo Lake were processed statistically to study space-time distribution and seasonal succession. A slight space heterogeneity of the zooplankton was observed but the density trend is substantially homogenous. Zooplankton diversity is characterized by a minimum in April and May; in July and Aug. diversity appears stratified in the vertical with its highest indices in the most superficial layer and its lowest indices in the deepest layer. In Sept.-Oct. diversity tends to reach uniformly high values in the whole water column.--Copyright 1975, Biological Abstracts, Inc.
W78-00847

HYDROECOLOGICAL AND ZOOLOGICAL EXAMINATIONS IN THE PONDWEED FIELDS OF LAKE FERTO, (IN HUNGARIAN),
Eotvos Lorand Univ., Budapest (Hungary). Inst. for Systematic Zoology.
S. Andrikovics.
Allattani Kozl. 60(1-4), p 39-50, 1973.

Descriptors: Lakes, *Aquatic weeds, *Aquatic plants, Water temperature, Biology, *Water chemistry, Ions, Conductivity, Oxygen, Absorption, *Plant growth, Diptera.
Identifiers: Caenis horaria, Ceratophyllum demersum, Chloeon dipterum, Cyrnus flavidus, Erythromma najas, Glossiphonia heteroclita, Helobdella stagnalis, *Hungary(Lake Ferto), Ischnura pumilio, Litricularia vulgaris, Lymatia coleoptera, Micronecta pusilla, Myriophyllum spicatum, Myriophyllum verticillatum, Najas sp, Naucoris cimicoides, Pisciola geometra, Potamogeton pectinatus, Sigara striata, Thermomyzon tessulatum, *Pondweeds.

Ecological and zoological studies were conducted in stands of the pondweed species frequent in the Hungarian part of Lake Ferto (Potamogeton pectinatus, Myriophyllum spicatum, Myriophyllum verticillatum, Uticularia vulgaris, Ceratophyllum demersum). The hydroecological and zoological differences among powdered fields of various species composition and location during a typical summer period were investigated. The pondweed fields of Lake Ferto were classified into open-water pondweed fields, stands of clearings encircles by reedy stretches, and fields around mouths of inflowing waters. The humus content of deposit varied from 5.00-5.51%. The open-water pondweed fields had uniformly, lower water temperature, low conductivity, lower hydrogen carbonate and lower Na+ concentration, than the pondweed stands of the clearings enclosed by reedy parts, and the macrofauna was poorer. The correlated estimates of the single taxonomic units are illustrated. The richest macrofauna was found in the M. spicatum stands bordering on the reed fields: Micronecta pusilla, species of the subfamily Orthocladiinae (Chironomidae), Ischnura pumilio and the larvae of Erythromma najas. The organic content of the deposits varied from 6.06-6.82%. The most important hydrochemical characteristics of the open-water pondweed fields were, higher water temperature, higher conductivity, higher O2 consumption, higher hydrogen carbonate and silicate ion concentration. Macrofauna were richer both in species and number of individuals than in the open-water pondweed fields.--Copyright 1975, Biological Abstracts, Inc.
W78-00872

2I. Water In Plants

WATER REGIME OF PLANT CONTROLLED BY VARIOUS FACTORS ACTING ON ITS ROOT SYSTEM, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Inst., Leningrad (USSR).
S. I. Meleshchenko.
Fiziol Rast (Mosc) 21(6), p 1201-1206, 1974.

Descriptors: *Root systems, Correlation analysis, *Beans, *Nutrients, *Carbon dioxide, Plant physiology, Model studies, Regulation, *Plant growth.

The correlation between parameters of water exchange in the self-oscillatory regime and the action of physical factors of normal intensity was studied with the root system of an intact plant (bean). A temperature decrease of the nutrient solution within the range 25-20C increased the amplitude and period of self-oscillations and as their manifestation. Higher CO2 content in the nutrient solution decreased the rate of the self-oscillatory process in the same way as low hydrostatic pressure. The evidence is discussed from the viewpoint of a closed model for regulation of physiological processes in the plant.--Copyright 1976, Biological Abstracts, Inc.
W78-00504

WATER AND ENERGY CONSERVATION THROUGH EFFICIENT IRRIGATION MANAGEMENT,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 3F.
W78-00566

THE CONCEPT OF HYDRATURE AND ITS MEANING FOR THE WATER BALANCE OF PLANTS, (IN GERMAN),
Universitaet Hohenheim (Landwirtschaftliche Hochschule) (West Germany). Abt. Okohysiologisches Veg.
K. Kreeb.
Ber Dtsch Bot Ges 87(3), p 577-580, 1974.

Descriptors: *Water balance, *Plant physiology, Ecology, Equations, Osmotic pressure, *Indicators.
Identifiers: *Hydrature(Plants).

The definition of hydrature based on thermodynamics is given and the osmotic equation discussed. Osmotic potential and water potential are compared with regard to their validity as physiological and ecophysiological indicators.--Copyright 1976, Biological Abstracts, Inc.
W78-00653

DISPERSION ANALYSIS OF THE EFFECT OF ECOLOGICAL CONDITIONS ON THE VARIABILITY OF THE WATER CONTENT IN MEADOW PLANT LEAVES, (IN RUSSIAN),
Leningrad State Univ. (USSR).
L. N. Alekseenko.
Bot Zh (Leningr). 59(7), p 996-1002, 1974.

Descriptors: *Dispersion, Ecology, *Leaves, *Moisture content, Plant growth, *Soil moisture, Grasslands, Climates, Plant groupings.

The effect of soil moisture (3-4 gradations, in a single factor complex), the effects of soil moisture and plant vegetation phase (4-6 periods, in a 2 factor complex) and the additional effect of weather conditions of various years (2 gradations, in a 3 factor complex) on the resultant index were evaluated. Plants (37 spp.) were studied from 5 associations: Trifolietum phleumoso-geraniosum; Mixtoherbetum graminosotrifoliosum; Deschampsietum gigrofitica herbosum; Deschampsietum carcosum inflatae; and Caricetum inflatae deschampsiosum. Soil moisture had a large effect on the water content of leaves with a relatively stable water regime; its effect was not high in species with highly variable leaf water content, but in a dry year its effect noticeably increased. The effect of plant vegetation phase on the resultant index was small in long-flowering species, but it also increased in a dry year. Under normal water conditions the effect of soil moisture on leaf water content and its variability was slightly higher than the effect of vegetation phase, and the total effect of the 2 factors was noticeably higher in a dry year. The effect of weather conditions on leaf moisture was greater in species with a mobile water regime than in those with a more stable one.--Copyright 1975, Biological Abstracts, Inc.
W78-00744

32P, 22N AND 99MTC IN EXPERIMENTS CONCERNING WATER TRANSPORT IN THE AERIAL ROOTS OF VANDA TRICOLOR LINDL., (IN GERMAN),
Giessen Univ. (West Germany). Lehrstuhl Botank (II).
N. F. Haas.
Z Pflanzenphysiol 75(5), p 427-435, 1975.

Descriptors: *Root systems, *Radioisotopes, *Tracers, Plant physiology, Phosphorus, Sodium, Electron microscopy.
Identifiers: *Aerial roots(Plants), Phosphorus-32, Sodium-22, Technetium-99M, *Vanda-tricolor, *Water transport(Plants).

In order to investigate transport of H2O within aerial roots of V. tricolor Lindl., 32P, 22N and 99mTc were applied to both air-dry and H2O-soaked roots. Active transport of H2O carrying the nuclide takes place in direction from stem and leaves with an average speed of about 3 cm/h in air-dry, but of about 6 cm/h in H2O-soaked aerial roots. No active transport was detected in the direction of the root tips. Scanning electron micrographs show the fine structure of cell walls of both velamen and passage cells of the exodermis. The latter show very fine pores of a diameter not exceeding 0.8 microns.--Copyright 1976, Biological Abstracts, Inc.
W78-00858

2J. Erosion and Sedimentation

PHOSPHATE/SEDIMENT INTERACTION IN TOLO AND LONG HARBOURS, HONG KONG AND ITS ROLE IN ESTUARINE PHOSPHORUS AVAILABILITY,
Fisheries Research Station, Aberdeen (Hong Kong).

For primary bibliographic entry see Field 5B.
W78-00516

PREDICTION OF MERCURY DISTRIBUTION IN RIVER SEDIMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00517

ARMORING PROCESS IN DEGRADING STREAMS,
Mosul Univ. (Iraq). Dept. of Civil Engineering.
R. J. Garde, K. A-S Ali, and S. Diette.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY9, p 1091-1095, September 1977. 4 fig, 2 ref, 1 append.

Descriptors: *Degradation(Stream), *Laboratory tests, *Stream erosion, Sediment transport, Graded, Running waters, Measurement, Alluvial channels, Movement, Sampling, Hydraulic models, Testing.
Identifiers: *Armoring process(Sediments).

Whenever the amount of sediment coming into a given reach of an alluvial stream is less than its sediment transport capacity, there is a general lowering of the stream bed-a process known as degradation. The most common occurrence of degradation is downstream of a large capacity reservoir on an alluvial stream. Experiments were conducted in a tilting flume provided with a false bottom. In the central portion a recess was provided, which was filled with sand of given characteristics. The recess was then covered, and uniform flow was established in the flume. The cover over the recess was then removed, and at definite time intervals the surface layer was sampled. The experimental investigation indicated that the major coarsening of the surface layer in a degrading stream takes place in a relatively short period of time; thereafter the coarsening process is extremely slow. The present set of data used for analysis was within a narrow range of geometric standard deviation of the bed material, and therefore there is a need for further experimentation. (Humphreys-ISWS)
W78-00527

SUBROUTINE FOR SETTLING VELOCITIES OF SPHERES,
Water Resources Engineers, Inc., Walnut Creek, CA.
M. B. Sonnen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY9, p 1097-1101, September 1977. 2 fig, 4 ref, 1 append.

Descriptors: *Computer programs, *Settling velocity, *Mathematical models, Programs, Velocity, Drag, Equations, Stokes law, Reynolds number.
Identifiers: Spheres, Terminal velocity.

Numerous engineering studies require the settling velocity of particles in quiescent water. The problem is complicated by having to determine the Reynolds number-drag coefficient relationship for the particle size, density, and viscosity conditions that pertain. If the relationship is in the 'transition range' between purely viscous resistance and eddying resistance (Reynolds number between roughtly 0.5 and 3,000, respectively), a nettling, if not difficult, trial-and-error solution ensues. Reported herein was a computer program subroutine which determines the settling velocity of any spherical particle, for any of the 3 ranges of Reynolds number and drag coefficient. The program was presented as a subroutine since its purpose is so singular, and because normally it would be used in a program designed to make many other computations. Very minimal alterations could convert it to a stand-alone program to read the necessary data, to perform its specific duty, and to print the results. (Humphreys-ISWS)

W78-00528

NITRIFICATION AND DENITRIFICATION IN MARINE SEDIMENTS FROM PUGET SOUND,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00537

THE SULFUR CYCLE OF A COASTAL MARINE SEDIMENT (LIMFJORDEN, DENMARK),
Aarhus Univ. (Denmark). Inst. of Ecology and Genetics.
For primary bibliographic entry see Field 5B.
W78-00538

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 1. MASS TRANSFER PROPERTIES AND SILICA DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environnnement.
For primary bibliographic entry see Field 5B.
W78-00542

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 2. NITROGEN DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environment.
For primary bibliographic entry see Field 5B.
W78-00543

EVALUATION OF THE STORAGE OF DIFFUSE SOURCES OF SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
J. B. Laronne, and S. A. Schumm.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 606, Price codes: A07 in paper copy, A01 in microfiche.
Colorado Environmental Resources Center Fort Collins, Completion Report Series No. 79, September 1977. 111 p, 17 fig, 12 tab, 54 ref, append.
OWRT B-121-COLO(2), 14-31-0001-5061.

Descriptors: *Salinity, *Colorado River Basin, Evaluation, *Alluvium, *Shales, Sedimentary rocks, Salts, Equilibrium, *Geochemistry, *Dissolved solids, *Sediment discharge, Sediment transport, Suspended solids, Utah, Colorado, Deposition(Sediments).
Identifiers: *Upper Colorado River Basin, *Mancos Shale(Colo-Utah).

The objectives were to determine the salt content of Mancos Shale and associated alluvium and the release mechanisms of salt from these deposits. When mixed with distilled water, the time necessary to approach equilibrium decreased with an increase of salt content and with a decrease of sediment concentration, and the time span required for equilibrium ranged from a few minutes to several days. The chemical quality of the aqueous mixtures was of the Ca 2+-Mg2+-Na1+-SO42-HCO31- type. Sodium and magnesium hydrated sulfates appeared to dissolve faster than gypsum of calcite and the relative abundance of Na1+, Mg2+ and SO42- decreased with increased dilution. There is a large inherent variability in the salt content of sampled sediments. Soluble mineral content of Mancos Shale from hillslopes (2 percent) is significantly larger than that of terrace alluvium (0.62-0.29 percent) and bed materials (0.93-0.81 percent) of North Miller and West Salt Creeks respectively. The most saline deposits (10 percent) are efflorescent bed crusts. Terrace and bed materials in narrow valleys where shallow alluvium overlies shale are highly saline (1.6 percent) and show an increase in salt content with depth. The results also show that major areas of diffuse sources of salts are also the major sediment contributors in the Upper Colorado River Basin.

W78-00550

BAYES DESIGN OF A RESERVOIR UNDER RANDOM SEDIMENT YIELD,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources; and Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
L. Duckstein, F. Szidarovszky, and S. Yakowitz.
Water Resources Research, Vol. 13, No. 4, p 713-719, August 1977. 4 fig, 2 tab, 35 ref. OWRT B-043-ARIZ(14a), NSF GF-38183.

Descriptors: *Reservoirs, *Reservoir design, *Sedimentation, *Model studies, Mathematical models, Runoff, Erosion, Sediments, Precipitation(Atmospheric), Rainfall, Reservoir silting, Reservoir storage, Sediment yield, Statistical models, Design, Decision making.
Identifiers: *Bayesian methods.

The design of a reservoir subject to long-range sediment accumulation stemming from the sum of a random number of random sedimentation events was investigated. The event-based simulation method, which was applied to a case study in southern Arizona, involves generating synthetic sequences of Poisson inputs into the modified universal soil loss equation. The stochastic inputs result from a fitted bivariate distribution of runoff-producing precipitation events (representing the amount and duration of such precipitation) and an independent fitted exponential distribution of interarrival time between events. The simulated sequences of sediment yield events thus obtained were used to calculate accumulated sediment yield and cost of a given design for each sequence. The optimum design and corresponding Bayes risk were evaluated in four cases: (1) under natural uncertainty, (2) under natural uncertainty and uncertainty in the bivariate rainfall distribution parameters, (3) under natural uncertainty and uncertainty in the Poisson counting distribution parameter, and (4) under all 3 types of uncertainty. The effect of rainfall record length was ascertained by further computer experiments, but only a partial Bayesian analysis was provided because of the complexity created by a three-dimensional parameter uncertainty. The optimum reservoir capacity and corresponding Bayes risk were shown to increase substantially (up to 20 and 90%, respectively) as more uncertainties are incorporated into the model. (Sims-ISWS)
W78-00618

EFFECT OF SOIL STRENGTH ON SOIL DETACHMENT DUE TO RAINDROP IMPACT,
Minnesota Univ., St. Paul.
For primary bibliographic entry see Field 2G.
W78-00677

SEDIMENT TRANSPORT FROM A RURAL CATCHMENT IN NEW SOUTH WALES,
Newcastle Univ. (Australia). Dept. of Geography.
R. J. Loughran.
Journal of Hydrology, Vol. 34, No. 3/4, p 357-375, August 1977. 7 fig, 6 tab, 18 ref.

Descriptors: *Sediment transport, *Distribution patterns, *Sedimentation rates, *Sampling, Wet seasons, Hydrographs, Sediment yield, Mathematical studies, Data collections, Foreign countries, Foreign research, Seasonal, *Australia.
Identifiers: *Congewai Creek(New South Wales), Depth-integrated sampling.

Both depth-integrated and single-stage suspended sediment sampling was carried out on the Congewai Creek in New South Wales, Australia, over a two-year, non-contiguous period. The samples were divided seasonally into rising, falling, and stationary stage groups. Sediment load was obtained from the hourly hydrograph by 2 methods: (1) concentration vs time graphs, and (2) seasonal regression lines. Considerable differences in load were obtained with the 2 methods for each year,

but the totals for the 2-year period were within 8% of each other. It was found that 99% of the 2-year load was yielded in the first 6 calendar months. Out of the 20 flood rises recorded in 2 years, 18 occurred during January through June. The average annual sediment yield was computed as 28 tons per square kilometer. (Singh-ISWS)
W78-00680

QUALITY OF WATER DISCHARGED FROM THREE SMALL AGRONOMIC WATERSHEDS IN THE MAUMEE RIVER BASIN,
Ohio Agricultural Research and Development Center, Wooster. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00688

SOLUBLE AND SEDIMENT NITROGEN LOSSES AS RELATED TO LAND USE AND TYPE OF SOIL IN EASTERN CANADA,
Macdonald Coll., Ste Anne de Bellevue (Quebec). Dept. of Renewable Resources.
For primary bibliographic entry see Field 5B.
W78-00689

EFFECTS OF VARYING DISCHARGE REGIMES ON BED-FORM SEDIMENTARY STRUCTURES IN MODERN RIVERS,
Keele Univ. (England). Dept. of Geology.
C. M. Jones.
Geology, Vol. 5, No. 9, p 567-570, September 1977. 2 fig, 29 ref.

Descriptors: *Sediment transport, *Rivers, *River beds, Discharge(Water), Sand waves, Erosion, Geomorphology, Fluvial sediment, Geology, Hydrology.
Identifiers: *Stream regimes, Sedimentary structures, Bed-form, Bed-form response.

The discharge regimes that occur in modern rivers vary with climate. Where there are large sand waves in a river, these show different responses to flow changes of different speeds and magnitudes. A rapid fall of discharge leaves bed forms stranded in the river, with flow around the front eroding the slip faces. With a slower rate of fall, smaller superimposed sand waver produce groups of convex-upward erosion surfaces within tabular cross-bedded sets. With a very slow fall and pronounced low-stage reworking, the sand waves are largely dissected. (Lee-ISWS)
W78-00696

GEOMORPHOLOGY, SHALLOW SUBBOTTOM STRUCTURE, AND SEDIMENTS OF THE ATLANTIC INNER CONTINENTAL SHELF OFF LONG ISLAND, NEW YORK,
Coastal Engineering Research Center, Fort Belvoir, VA.
For primary bibliographic entry see Field 8B.
W78-00704

RECONNAISSANCE OF WATER QUALITY IN THE DUCHESNE RIVER BASIN AND SOME ADJACENT DRAINAGE AREAS, UTAH,
Geological Survey, Salt Lake City, UT. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-00820

SIMULATION OF VELOCITY DISTRIBUTION AND MASS TRANSFER,
Geological Survey, Denver, CO. Water Resources Div.
C. F. Nordin.
In: Stochastic Approaches to Water Resources, Volume II: Edited and published by Hsieh Wen Shen, Colorado State University, Fort Collins, Colorado, p 22-1 - 22-22, 1976. 12 fig, 41 ref.

Descriptors: *Model studies, *Sediment transport, *Particle size, *Bed load, *Open channel flow, Analytical techniques, Simulation analysis, Turbulent flow, Fluid mechanics, Equations, Evaluation.
Identifiers: *Velocity distribution.

Various random walk models are presented and used to describe one-dimensional transport processes in open-channel flows of both dissolved or suspended particles and bed load particles. These models generally assume that the particle steps are uncorrelated or that the correlation function of the particle velocity is of simple form, so they provide excellent approximations to the theoretical asymptotic distributions and are well-suited to simulation techniques. However there are some discrepancies between empirical observations and the theories, and to simulate particle behavior for short times, it may be necessary to introduce correlated processes or time-varying parameters into the existing models. (See also W77-10439) (Woodard-USGS)
W78-00825

ALLUVIAL CHANNEL BEDFORMS,
Geological Survey, Denver, CO. Water Resources Div.
C. F. Nordin.
In: Stochastic Approaches to Water Resources, Volume II: Edited and published by Hsieh Wen Shen, Colorado State University, Fort Collins, Colorado, p 24-1 - 24-28, 1976. 20 fig, 25 ref.

Descriptors: *Alluvial channels, *Streambeds, *Channel morphology, *Sands, *Bottom sediments, Forecasting, Sediment distribution, Theoretical analysis, Evaluation.

The bed configurations formed in alluvial streams with beds of fine sand are illustrated and described briefly, and some of the empirical and theoretical relations for predicting the occurrence of the various bed configurations are reviewed. With increasing flow velocities, for a constant flow depth and a fine sand, the major bed configurations are ripples, dunes, a stable flat bed, and antidunes. For coarse sands, ripples do not form, and the dune bed configuration may be followed immediately by antidunes. In addition to these small-scale features, a very regular pattern of large alternate bars forms in uniform wide channels. The general flow conditions for the occurrence of the various bedforms can be predicted from empirical relations. The empirical and theoretical relations give an indication of the conditions under which the various bed configurations form, but these relations say very little about the properties of the bedforms. Although stochastic models of bed configurations are as yet rather crude, it is suggested that the application of the theory of stochastic processes to the description and prediction of the occurrence of bedforms will provide important contributions to further understanding of these phenomena. (See also W77-10439) (Woodard-USGS)
W78-00826

2K. Chemical Processes

REACTIONS OF ORGANOMERCURY (I) COMPOUNDS WITH LIGANDS CONTAINED IN NATURAL WATER SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-00502

NORTHERN KALAHARI GROUNDWATERS: HYDROLOGIC, ISOTOPIC AND CHEMICAL STUDIES AT ORAPA, BOTSWANA,
University of the Witwatersrand, Johannesburg (South Africa). Nuclear Physics Research Unit.
For primary bibliographic entry see Field 2F.
W78-00521

COMPUTATIONAL HYDRAULICS: AN ALTERNATIVE VIEW,
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
For primary bibliographic entry see Field 5B.
W78-00524

EVALUATION OF THE STORAGE OF DIFFUSE SOURCES OF SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 2J.
W78-00550

KINETICS OF SALT RELEASE FROM A SALINE SOIL,
Utah State Univ., Logan. Dept. of Soil Science and Biometeorology.
For primary bibliographic entry see Field 2G.
W78-00676

COLORIMETRIC METHOD OF DETERMINATION OF AMIBEN IN AIR, WATER AND SOIL,
Kiev Inst. for the Advanced Training of Physicians (USSR).
For primary bibliographic entry see Field 5A.
W78-00700

POLYCYCLIC AROMATICS IN SURFACE AND GROUND WATER,
For primary bibliographic entry see Field 5A.
W78-00702

COMPUTER PROGRAM FOR CALCULATING PRESSURE-BROADENED RAMAN SPECTRA FOR MOLECULAR NITROGEN AND OXYGEN,
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
C. Fralick.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-37473, Price codes: A03 in paper copy, A01 in microfiche. NASA/TM X-3427, October 1976. 29 p, 11 fig, 16 ref, 4 append.

Descriptors: *Computer programs, *Spectroscopy, *Nitrogen, *Oxygen, *Mathematical studies, Pressure, Measurement, Instrumentation, Analytical techniques, Mathematics, Temperature, Molecular structure.
Identifiers: *Raman spectroscopy, *Molecular rotation, Pressure broadening, *Molecular nitrogen, Molecular oxygen.

A computer program was given for calculating the rotational Raman spectrum for molecular nitrogen and oxygen. Provision was made for pressure broadening. Several sample calculations at various pressures were shown. The relative heights of some of the lines were affected by pressure broadening. (Henley-ISWS)
W78-00703

ANALYSIS OF THE SATURATED-UNSATURATED HYDRAULIC CONDUCTIVITY IN A MIXED SODIUM-CALCIUM SOIL SYSTEM,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel).
For primary bibliographic entry see Field 2G.
W78-00709

EFFECT OF MIXED NA-CA SOLUTIONS ON THE HYDRAULIC PROPERTIES OF UNSATURATED SOILS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel).
For primary bibliographic entry see Field 2G.
W78-00710

THE NATURE AND BEHAVIOR OF GASES IN NATURAL WATERS,
Geological Survey of Canada, Ottawa (Ontario). Resource Geophysics and Geochemistry Div.
W. Dyck, and I. R. Jonasson.
Water Research, Vol. 11, No. 8, p 705-711, 1977. 5 fig, 2 tab, 7 ref.

Descriptors: *Gases, *Water analysis, *Canada, Analytical techniques, *Water chemistry, Water properties, Mass spectrometry, Instrumentation, Chemistry, Argon, Carbon dioxide, Helium, Hydrogen, Methane, Nitrogen, Oxygen, Hydrogen sulfide, Geochemistry, Groundwater.
Identifiers: *Natural waters, *Dissolved gases, *Mineral exploration, Mass spectrometer method.

During the past 2 years tests were carried out to determine the nature and behavior of dissolved gases in natural waters from a variety of different environments. The environments tested included surface stream and lake waters, groundwaters from wells and springs, and drill hole waters from uranium and copper deposits. Close to 800 water samples were analyzed to date for the following gases: H2, He, CH4, Ne, N2, O2, H2S, Ar, CO2, and Rn. The first 9 were determined using a mass spectrometric method with an average sampling and analytical precision of about 20%. Rn was determined with similar precision using silver-activated ZnS counters. The gases of interest from the viewpoint of biochemical and geochemical activity were found to be H2, He, CH4, O2, H2S, CO2, and Rn. Ne, N2, and Ar revealedd no clearly recognizable patterns of dispersion. The composition of the dissolved gases from the sampled environments varied over a wide range. Generally speaking, the occurrence of specific gases in specific environments usually could be interpreted in terms of the known geochemistry of the environment. The presence of He anomalies was most difficult to explain. Its chemical inertness and related high geochemical mobility permit He to travel great distances from its source. He and Rn always were present in all environments tested. Gases in surface waters contained, as a rule, only equilibrium amounts of He. In waters near U deposits, a positive correlation between He and Rn was observed. (Henley-ISWS)
W78-00712

CHEMISTRY OF SULFUR IN THE ATMOSPHERE,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5A.
W78-00738

GROUND-WATER INVESTIGATION AT THE ALLUVIAL FAN OF THE SOUTH FORK EAGLE RIVER, ANCHORAGE, ALASKA - RESULTS OF TEST DRILLING, 1976,
Geological Survey, Anchorage, AL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00810

CHEMICAL, ISOTOPIC, AND GAS COMPOSITIONS OF SELECTED THERMAL SPRINGS IN ARIZONA, NEW MEXICO, AND UTAH,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00815

RECONNAISSANCE OF WATER QUALITY IN THE DUCHESNE RIVER BASIN AND SOME ADJACENT DRAINAGE AREAS, UTAH,
Geological Survey, Salt Lake City, UT. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-00820

2L. Estuaries

ECOLOGICAL-FAUNISTIC INVESTIGATIONS ON THE MEIOBENTHOS OF THE SAALER BODDEN, GDR, BALTIC SEA, (IN GERMAN),
J. Beschnidt, and B. Noack.
Int Rev Gesamten Hydrobiol 61(1), p 89-104, 1976.

Descriptors: *Benthos, Ecology, Biomass, Brackish water, Diptera, Copepods, Nematoda, Sea water.
Identifiers: *Baltic Sea, Halacarida, Harpacticoida, Meid, Oligochaeta, Ostracoda, *Saaler Bodden(E Germany).

The meiofauna of the Saaler Bodden was investigated from Sept. 1969-April 1970. The Saaler Bodden is that part of a brackish water system which is situated farthest from the Baltic Sea. In the southern part fresh water may be found; in the northern part, the salinity rises to a maximum of 5-6%. A short review is given of the hydrographical and biological peculiarities of the Saaler Bodden followed by remarks as to the qualitative and quantitative distribution of the meiofauna. Abundance and biomass are determined for Nematoda, Oligochaeta, Ostracoda, Copepoda, Harpacticoida, Halacrida and Chironomid larvae. Oligochaeta and Ostracoda are dealt with in detail. The ecological requirements of the different species are discussed in this connection and their role in the balance of matter of this water body is pointed out.--Copyright 1976, Biological Abstracts, Inc.
W78-00501

PHOSPHATE/SEDIMENT INTERACTION IN TOLO AND LONG HARBOURS, HONG KONG AND ITS ROLE IN ESTUARINE PHOSPHORUS AVAILABILITY,
Fisheries Research Station, Aberdeen (Hong Kong).
For primary bibliographic entry see Field 5B.
W78-00516

FUTURE SEA-LEVEL CHANGES DUE TO WEST ANTARCTIC ICE SHEET FLUCTUATIONS,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research; and Cooperative Inst. for Research in Environmental Science, Boulder, CO.
For primary bibliographic entry see Field 2C.
W78-00518

PREDICTING ESTUARINE SALINITY FROM RIVER INFLOWS,
California Univ., Berkeley. Dept. of Civil Engineering.
J. A. Harder.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY8, Proceedings Paper 13152, p 877-888, August 1977. 6 fig, 9 ref, 2 append.

Descriptors: *California, *Mathematical models, *Salinity, *Tidal effects, *Hydrograph analysis, Estuaries, Hydrologic data, Analysis, Forecasting, Hydrographs, Numerical analysis, Streamflow.
Identifiers: *Non-linear systems, *Freshwater inflow, *San Francisco Bay(Calif).

An analysis system was described that enables the second-order and higher nonlinear interactive effects to be estimated in the relationship between the input and output of nonlinear systems. No data are required, in principle, other than an input and output time history over a sufficient period. The method was compared with the functional approach of Weiner, and it was shown to have advantages in practical application. An application to the prediction of salinity in estuaries from river inflows was described. An error analysis for the prediction of salinity at Benicia, California, showed that systematic errors in the data and the influence of unaccounted-for variables contribute the bulk of the error in making the predictions and that the error attributable to the analysis leading to the construction of the predictor contributes a smaller error, which is estimated to be on the order of 8% in the application. (Adams-ISWS)
W78-00526

NITRIFICATION AND DENITRIFICATION IN MARINE SEDIMENTS FROM PUGET SOUND,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00537

THE SULFUR CYCLE OF A COASTAL MARINE SEDIMENT (LIMFJORDEN, DENMARK),
Aarhus Univ. (Denmark). Inst. of Ecology and Genetics.
For primary bibliographic entry see Field 5B.
W78-00538

THE FLAX POND ECOSYSTEM STUDY: EXCHANGES OF CARBON IN WATER BETWEEN A SALT MARSH AND LONG ISLAND SOUND,
Marine Biological Lab., Woods Hole, MA.
For primary bibliographic entry see Field 5B.
W78-00539

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 1. MASS TRANSFER PROPERTIES AND SILICA DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environnnement.
For primary bibliographic entry see Field 5B.
W78-00542

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 2. NITROGEN DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environment.
For primary bibliographic entry see Field 5B.
W78-00543

ON THE DISTRIBUTION OF NITRATE NITROGEN IN THE PACIFIC OCEAN,
Meteorological Coll., Kashiwa, Chiba Pref., (Japan).
T. Sagi.
Papers in Meteorology and Geophysics, Vol. 28, No. 1, p 29-39, March 1977. 7 fig, 1 tab, 12 ref.

Descriptors: *Nitrates, *Pacific Ocean, *Sampling, *Chemical analysis, Oceans, On-site investigations, Chemicals, Automation, Analytical techniques, Data processing, *Distribution patterns, Temperature, Water temperature, Salinity, Nutrients, Dissolved oxygen, Oceanography, *Path of pollutants, Water pollution sources.
Identifiers: *Nitrate-nitrogen.

The desirable conditions for the operation of the Auto-Analyzer system were confirmed for the determination of nitrate in seawater. Based on nitrate data obtained up to the present, some characteristics were described with respect to the horizontal distributions on the isobaths and the vertical distributions along several meridians. (Sims-ISWS)
W78-00547

THE DISTRIBUTION OF DIATOMS IN MISSISSIPPI SALT MARSHES,
Mississippi State Univ., Mississippi State. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W78-00555

HYDROLOGIC AND BIOLOGIC CHARACTERISTICS OF NATURAL CHANNELS IN COASTAL MARSH OF MISSISSIPPI,
University of Southern Mississippi, Hattiesburg. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-00568

STUDIES ON THE OIL POLLUTION OF SEDIMENTS IN THE SETO INLAND SEA,
Hiroshima Univ. (Japan). Dept. of Fisheries.
For primary bibliographic entry see Field 5B.
W78-00571

FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS AND ECOSYSTEMS.
For primary bibliographic entry see Field 5C.
W78-00572

LONG TERM BIOLOGICAL EFFECTS OF BUNKER C OIL IN THE INTERTIDAL ZONE,
New Brunswick Univ., St. John. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-00597

BIOLOGICAL SURVEY OF INTERTIDAL AREAS IN THE STRAITS OF MAGELLEN IN JANUARY, 1975, FIVE MONTHS AFTER THE METULA OIL SPILL,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
For primary bibliographic entry see Field 5B.
W78-00598

CHEMICAL CARCINOGENS IN THE MARINE ENVIRONMENT BENZO(A)PYRENE IN ECONOMICALLY IMPORTANT BIVALVE MOLLUSKS FROM OREGON ESTUARIES,
Oregon State Univ., Corvallis. Dept. of General Science.
For primary bibliographic entry see Field 5B.
W78-00615

DISTRIBUTION OF PETROLEUM HYDROCARBONS IN WESTERNPORT BAY (AUSTRALIA): RESULTS OF CHRONIC LOW LEVEL INPUTS,
Victoria Ministry for Conservation, Melbourne (Australia).
For primary bibliographic entry see Field 5B.
W78-00617

A SIMPLIFIED MODEL OF SALT WATER ENCROACHMENT IN AN AQUIFER (UN MODELE SIMPLIFIE POUR LA SIMULATION DES NAPPES AVEC INTRUSION SALINE),
Bureau de Recherches Geologiques et Minieres, Orleans (France).
M. Bonnet, and J-P. Sauty.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, p 45-56, 1975. 7 fig, 1 ref.

Descriptors: *Aquifers, *Saline water intrusion, *Simulation analysis, *Mathematical models, Saline water-freshwater interfaces, Wells, Equations, Optimization, Linear programming, Systems analysis.
Identifiers: *Coastal aquifers, Hydrodispersive models, Prediction, Dupuit assumption, Finite difference formulation, Classic one-phase model.

The modeling of coastal aquifers with salt water encroachment and, especially, simulation of the influence of an extensive exploitation by wells present delicate problems. To accurately account for all physical phenomena existing in the saline zone and the interface between it and the fresh water aquifer, one must set up hydrodispersive models which appear very complicated and necessitate a fine discretization in space and time. This demands much computer time since in real cases one must make long-term predictions for large areas of influence. To overcome this difficulty, an approach is proposed which rests upon the two most usually admitted assumptions as a first approximation: the two phases (fresh and salt water) are supposed immiscible and their interface is without any dispersion. The Dupuit assumption is verified for both salt and fresh water flows. Upon this basis it is possible to set up a finite difference formulation totally implicit in time which is stable for a node spacing of usual size and which admits time steps of reasonable extension. This model was used in connection with a classic one-phase model and a linear programming optimization model to determine the best well pattern in a coastal aquifer located along the north Moroccan Atlantic coast: presented are the different steps taken for successive application of these models and conclusions on the measures to be taken for the exploitation of such an aquifer. (See also W77-10419) (Bell-Cornell)
W78-00638

COASTAL ZONE LEGAL REFERENCES, 1976.
State Univ. of New York at Buffalo, Amherst. Sea Grant Law Center.
For primary bibliographic entry see Field 6E.
W78-00657

DEEP WATER RENEWAL OF LOCH ETIVE: A THREE BASIN SCOTTISH FJORD,
Dunstaffnage Marine Research Lab., Oban (Scotland).
A. Edwards, and D. J. Edelsten.
Estuarine and Coastal Marine Science, Vol. 5, No. 5, p 575-595, September 1977. 11 fig, 1 tab, 17 ref.

Descriptors: *Fjords, *Water circulation, *Surveys, *Mathematical models, Salinity, Water quality, On-site investigations, Currents(Water), Tidal waters, Estuaries, Hypolimnion, Surface waters, Surface runoff, Mixing, Overflow, Dissolved oxygen, Water temperature, Entrainment, Stagnant water, Foreign research, Foreign countries.
Identifiers: *Loch Etiv(Scotland).

Loch Etive is a fjord with 3 basins. Innermost bottom water stagnates for months or years, with slowly changing temperature and salinity, falling deep oxygen concentration, and with a secondary pycnocline below sill depth. A bottom water renewal was described and shown to be caused by low freshwater runoff. The renewal is a series of overflows of sill water during spring flood tides. During overflow, dense fluid forms a turbulent plume whose observed behavior is similar to that expected from theory: an entrainment constant of 0.013 is found on a bottom slope of 6 deg. Observations of salinity in the sill region show that the flushing time there is 4 weeks and that this is the response time of the renewal mechanism to changes in runoff. A model of the non-linear dependence of renewal upon runoff was made and used to hindcast during 1964-1975. The hindcast was verified and showed that renewal is aperiodic, with a mean repetition time of 1 1/3 years. (Humphreys-ISWS)
W78-00683

TIME AND SPACE VARIATION IN THE SURFICIAL SEDIMENTS OF THE NEW YORK BIGHT APEX,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
W. L. Stubblefield, R. W. Permenter, and D. J. P. Swift.
Estuarine and Coastal Marine Science, Vol. 5, No. 5, p 597-607, September 1977. 7 fig, 8 plate, 14 ref.

Descriptors: *Sediments, *Distribution patterns, *Continental shelf, *New York, *Coasts, Spatial distribution, Temporal distribution, Annual, Waste disposal, Tidal waters, On-site tests, On-site investigations, Surveys, Sampling, Instrumentation, Spoil banks, Sewage disposal, Oceans, Sounding, Sonar.
Identifiers: *New York Bight, Surficial sediments, Ocean dumping.

Sidescan sonar records, grab samples, and bottom photographs were collected along 2 transects in the New York Bight apex, on a quarterly basis for 6 quarters. Sampling was designed to determine the natural variability of bottom deposits in time and space and the effects of ocean dumping on the patterns. The Hudson Shelf Valley and the christianensen Basin at its head are floored by fine muddy sand and mud, while the high areas on either side are covered by medium grained sand. Bottom sands on the seaward side are relatively uniform. On the New Jersey side, and near the Long Island coast, sand ribbon-like patterns with spacings of 10-200 m appear. Separate dumpsites for sewage sludge, dredge spoil, cellar dirt, and acid waste occur within the area. The distribution of grain sizes and bedform patterns are stable over time, indicating that the bottom is in a state of textural near-equilibrium with the hydraulic climate. The effects of ocean dumping are most obvious in the vicinity of the dredge spoil dumpsite, which has shoaled 15 m within the last years. Here an aureole of anomalously fine sediment is spreading over a bottom locally composed of artificial rubble. Cholera Band, the area where the highly mobile sewage sludge is dumped, is floored by sand; no permanent sludge deposits form. The bottom muds of the adjacent Christianensen Basin, however, may be contaminated with this material. (Humphreys-ISWS)
W78-00684

RECENT CARBONATE SEDIMENTATION IN CONNEMARA, WESTERN IRELAND,
Reading Univ. (England). Sedimentology Research Lab.
A. Gunatilaka.
Estuarine and Coastal Marine Science, Vol 5, No 5, p 609-629, September 1977. 6 fig, 2 tab, 35 ref.

Descriptors: *Geomorphology, *Coasts, *Bays, *Sedimentation, *Carbonate rocks, Sediments, Facies(Sedimentary), Mineralogy, Carbonates, On-site investigations, Tidal waters, Currents(Water), Sampling, Testing procedures, Detritus, Marine plants, Sands, Gravels, Magnesium, Strontium, Geochemistry, Foreign research, Foreign countries.
Identifiers: *Connemara(Ireland).

An extensive area of biogenic carbonate sedimentation characterize the Atlantic seaboard of Western Ireland. In accounting for the distribution of the sediments, perhaps the most significant factor is the orientation of the coastal and submarine morphology in association with a 230 deg wind vector that provides the main energy input into the sedimentary system. Four major sedimentary facies were recognized in the study area, each having a particular constituent composition and texture. The interaction of the energy flow with the coastal geomorphology results in the coarser sediments being confined to the more exposed parts of the embayments, while the finer sediments accumulate in the sheltered areas. The apparently simple relationships among grain size, particle composition, sorting, and the degree of sheltering from the energy flow indicate that the biogenic components are all hydrodynamically sorted and that the sediment assemblages reflect the degree of local environmental energy. In Connemara, skeletal breakdown is controlled primarily by biological processes. Superimposed on this is a secondary process of mechanical disintegration. If Connemara is assumed to be representative of temperate water carbonates, then there appears to be a fundamental difference in the mineralogical

and geochemical compositions of warm and temperate water carbonate regions. The two regions should be distinguished on the basis of their respective carbonate secreting organisms. (Humphreys-ISWS)
W78-00685

GEOMORPHOLOGY, SHALLOW SUBBOTTOM STRUCTURE, AND SEDIMENTS OF THE ATLANTIC INNER CONTINENTAL SHELF OFF LONG ISLAND, NEW YORK,
Coastal Engineering Research Center, Fort Belvoir, VA.
For primary bibliographic entry see Field 8B.
W78-00704

COASTAL ZONE MANAGEMENT PROGRAM DEVELOPMENT GRANTS.
National Oceanic and Atmospheric Administration, Washington, DC.
Federal Register, Vol. 42, No. 83, p 22036-53, April 29, 1977.

Descriptors: *Grants, *Shore protection, *Regulation, *Planning, *Coasts, Administrative agencies, Administrative decisions, Non-structural alternatives, Administration, Coastal marshes, Coastal plains, State governments, State jurisdictions, Oceanography, Oceans, Shores, Environmental control, Environment, Environmental effects, Erosion, Energy.
Identifiers: Coastal zones, Coastal zone management, Coastal management programs, *Coastal Zone Management Act of 1972, *National Oceanic and Atmospheric Administration.

The National Oceanic and Atmospheric Administration (NOAA) has amended its regulations pertaining to coastal zone management program development grants. A management program must include public shorefront access planning by taking into account existing facilities and future demand for visual and physical access while emphasizing the recreational needs of urban residents. Revised regulations also require planning for management of the impact from energy facilities located in coastal zone areas. Several approaches are suggested. States are required to articulate policies pertaining to shoreline erosion including preferences for structural or non-structural controls if any are desired. Guidelines and procedures employed in receiving, reviewing and providing preliminary approval for state coastal management programs and grant awards are set forth. The purposes of preliminary approval grants are to assist a state in insuring implementation of a fully developed program design and to provide for initial implementation of approved management elements. A summary of the major comments received about the regulations and the response by NOAA to the comments is included. (Mulligan-Florida).
W78-00777

FOUR MONOGRAPHS FOR THE GENERAL READER (WORLD OCEANS, LAW OF THE OCEANS, INSTITUTIONAL ARRANGEMENTS FOR THE LAW OF THE SEA, WORK OF THE THIRD UNITED NATIONS LAW OF THE SEA),
Miami Univ., FL. School of Law.
For primary bibliographic entry see Field 6E.
W78-00778

MARINE SCIENTIFIC RESEARCH AND THE LAW OF THE SEA CONFERENCE: SOME PROPOSED AMENDMENTS TO THE REVISED TEXT,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 6E.
W78-00779

THE THIRD UNITED NATIONS CONFERENCE ON THE LAW OF THE SEA: THE 1976 NEW YORK SESSIONS,
Bureau of Oceans and International Environmental and Scientific Affairs, Washington, DC.
For primary bibliographic entry see Field 6E.
W78-00784

OCEANOGRAPHY AND THE LAW OF THE SEA,
Portugese, State Secretariat for Fisheries, Lisbon.
For primary bibliographic entry see Field 6E.
W78-00787

THE PROPOSED OUTER CONTINENTAL SHELF LANDS ACT AMENDMENTS OF 1976: AN INADEQUATE GUIDE TO OUTER CONTINENTAL SHELF DEVELOPMENT,
Harvard Law School, Cambridge, MA.
For primary bibliographic entry see Field 6E.
W78-00800

PROBLEMS OF COASTAL MANAGEMENT,
Florida Dept. of Natural Resources, Tallahassee. Bureau of Beaches and Shores.
For primary bibliographic entry see Field 6E.
W78-00801

OCEANS '77 CONFERENCE RECORD.
Institute of Electrical and Electronics Engineers, Inc., New York.; and Marine Technology Society, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00827

1974 FLOATING BREAKWATERS CONFERENCE PAPERS.
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 8B.
W78-00840

THEORETICAL ANALYSIS OF FLOATING BREAKWATER PERFORMANCE,
Washington Univ., Seattle. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 8B.
W78-00842

GENERAL CHARACTERISTICS OF ESTUARIES, (IN SPANISH),
J. Martinell Callico.
Inmersion Cienc 8/9, p 7-14, 1975.

Descriptors: *Estuaries, *Aquatic insects, Mollusks, *Invertebrates, *Estuarine environment, *Aquatic animals, Marine animals.
Identifiers: Oligochaetes, *Paleographic analysis.

Studies of the present fauna of estuaries show that the number of species and their interrelations are smaller than in other sedimentary media. A detailed paleographic analysis may explain the original environments. Of the various components of the estuary facies, the freshwater specimens are least represented in these formations. Among the invertebrates the main freshwater components are the larvae of insects, oligochetes and a few mollusk pulmonates. In the lower part of an estuary the fauna is predominantly marine and is made up of species that live in the nearby marine areas. Those shore species accustomed to daily environmental changes are most likely to colonize an estuary. The flora is halophitic and scant; there are no xerophitic plants. The flora gets richer where the soil is firm.--Copyright 1976, Biological Abstracts, Inc.
W78-00848

EVALUATION OF GEOLOGIC HAZARDS IN OCS PETROLEUM LEASE AREAS, SOUTHERN CALIFORNIA CONTINENTAL BORDERLAND,
For primary bibliographic entry see Field 5G.
W78-00870

AN EVALUATION OF LOUISIANA SUPERPORT STUDIES AND IMPLICATIONS FOR COASTAL ZONE MANAGEMENT,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5G.
W78-00871

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

GROUND WATER IN THE LAJAS VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00822

3C. Use Of Water Of Impaired Quality

NITRATE-NITROGEN AND CHLORIDE MOVEMENT THROUGH UNDISTURBED FIELD SOIL,
Alabama A and M Univ., Normal.
For primary bibliographic entry see Field 5B.
W78-00520

KINETICS OF SALT RELEASE FROM A SALINE SOIL,
Utah State Univ., Logan. Dept. of Soil Science and Biometeorology.
For primary bibliographic entry see Field 2G.
W78-00676

3D. Conservation In Domestic and Municipal Use

THE IMPACT OF WATER SAVING DEVICE INSTALLATION PROGRAMS ON RESOURCE CONSERVATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sharpe, and P. W. Fletcher.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 825, Price codes: A04 in paper copy, A01 in microfiche. Institute for Research on Land and Water Resources, University Park, Research Publication 98, July 1977. 44 p, 4 fig, 14 tab, 14 ref, 4 append. OWRT A-038-PA(2). 14-31-0001-4038.

Descriptors: Pennsylvania, *Water utilization, *Water conservation, Costs, Sewage disposal, Water consumption, *Cost comparisons, Water users, Maryland, District of Columbia.
Identifiers: *Washington Suburban Sanitary Commission, *Water saving devices, Shower flow controls, *Minimum water use fixtures, *Waste flow reduction, Holding tank systems, Elevated sand mound, *Cost savings, On-lot sewage disposal, Minimum water use.

The water saving programs of the Washington Suburban Sanitary Commission (WSSC) were evaluated and found to have been effective in reducing customer water use. The methods used by the WSSC were analyzed and changes were suggested where appropriate. A study of the effec-

tiveness of bathing shower flow controls in college dormitories showed savings in shower water use of up to 60 percent were possible with commercially available devices. Gross savings to The Pennsylvania State University for such a program were estimated to be $100,000 annually. A comparison of costs for on-lot sewage disposal facilities with and without minimum water use fixtures was made. Cost savings were shown for elevated sand mound and holding tank systems using minimum water use technology based on calculated wasteflow reductions. (Sink-Penn State)
W78-00563

AN URBAN MODEL FOR THE EVALUATION OF ALTERNATIVE GROWTH POLICIES,
Oklahoma Univ., Norman. Bureau of Water and Environmental Resources Research.
For primary bibliographic entry see Field 6A.
W78-00649

THE DROUGHT,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2B.
W78-00807

QUANTITY AND QUALITY OF URBAN STORM WATER IN SOUTHEAST FLORIDA,
Geological Survey, Miami, FL. Water Resources Div.
C. B. Sherwood, and H. C. Mattraw.
In: Modern Developments in Hydrometry, Volume II: Proceedings of the International Seminar held at the University of Padua, Italy, September 8-13, 1975; World Meteorological Organization Report (WMO No 427), p 94-108, 1976. 7 fig, 1 tab, 1 ref.

Descriptors: *Urban hydrology, *Storm runoff, *Storm drains, *Water yield, *Water quality, *Florida, Cities, Data collections, Rainfall, Runoff, Sampling, Chemical analysis, Bacteria.
Identifiers: *Pompano Beach(Fla), Fort Lauderdale(Fla).

Rainfall, runoff, and water quality were monitored in a residential area in southeast Florida starting in March 1974. Rainfall was measured at three points in the area and the resulting runoff was measured in a storm sewer. Water samples were automatically collected in the storm sewer at intervals of 144 seconds throughout the period of runoff. By September 1974, 19 of 104 rainfalls produced runoff great enough to trigger the water-sampling mechanism. The chemical quality of the storm-sewer runoff was highly variable. Precise relations between loads, concentrations, and runoff have not yet been established. In general, however, the highest concentrations of chemical constituents were found in runoff that occurs after long dry periods, and lowest concentrations in runoff that occurs during a period of frequent rainfall. Peak concentrations for individual storms--in milligrams per liter--ranged from 5.3 to 0.7 for nitrogen, 1.35 to 0.15 for phosphorus, and 290 to 15 for chemical oxygen demand. A 1.1-inch rainfall of 30 minutes duration on June 16 had a peak flow of 19 cubic feet per second and loads of 1.4 pounds of nitrogen, 0.5 pounds of phosphorus, and 15 pounds of chemical oxygen demand. Total coliform bacteria counts in some storms were as high as 1.8 million colonies per 100 milliliters of water. (Woodard-USGS)
W78-00824

3E. Conservation In Industry

THE POTENTIAL IMPACT OF COAL-ENERGY DEVELOPMENT ON AGRICULTURE LAND RESOURCES IN WYOMING'S POWDER RIVER BASIN,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W78-00505

WASTES FROM SMALL POULTRY DRESSING ESTABLISHMENTS,
Center for Disease Control, Atlanta, GA.
For primary bibliographic entry see Field 5A.
W78-00510

TANNERY WASTE MANAGEMENT,
Cincinnati Univ., Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5D.
W78-00512

PENNSYLVANIA WATER RESOURCES RESEARCH CENTER TECHNOLOGY TRANSFER PROGRAMS - A CASE STUDY,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 4B.
W78-00565

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME I-SUMMARY REPORT,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 6G.
W78-00753

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME II-DETAILED ANALYSES AND SUPPORTING MATERIALS,
Oklahoma Univ., Norman. Science and Public Policy Program.
For primary bibliographic entry see Field 6G.
W78-00754

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME III-PRELIMINARY POLICY ANALYSIS,
Oklahoma Univ., Norman. Science and Public Policy Program.
For primary bibliographic entry see Field 6G.
W78-00755

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME IV-APPENDICES,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 6G.
W78-00756

3F. Conservation In Agriculture

WATER REGIME OF PLANT CONTROLLED BY VARIOUS FACTORS ACTING ON ITS ROOT SYSTEM, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Inst., Leningrad (USSR).
For primary bibliographic entry see Field 2I.
W78-00504

DEPENDENCE OF TRANSPIRATION AND DIFFUSION PRESSURE IN PLANTS ON SOIL MOISTURE CONTENT AND POTENTIAL, (IN BULGARIAN),
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Hydrotechnics and Ameliorations.
For primary bibliographic entry see Field 2D.
W78-00515

SOIL AIR PRESSURE UNDER SUCCESSIVE BORDER IRRIGATIONS AND SIMULATED RAIN,
Agricultural Research Service, St. Paul, MN.
For primary bibliographic entry see Field 2G.
W78-00536

WATER AND ENERGY CONSERVATION THROUGH EFFICIENT IRRIGATION MANAGEMENT,
Kansas Water Resources Research Inst., Manhattan.
L. R. Stone.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 810, Price codes: A02 in paper copy, A01 in microfiche. KWRRI Contribution Number 190, August 1977. 16 p, 2 fig, 7 tab, 7 ref. OWRT A-069-KAN(3). 14-31-0001-5016.

Descriptors: *Grain sorghum, *Corn(Field), Water utilization, Water conservation, Energy, Soil profiles, *Irrigation efficiency, Use rates, Crop production, *Growth stages, Kansas, Water management(Applied).
Identifiers: Grain yield, *Irrigation timing.

In a 3-year study, an evaluation was made of corn (Zea mays L.) and grain sorghum (Sorghum bicolor (L) Moench) yield and water use efficiency as influenced by irrigation timing. The study was located at Tribune (mean annual rainfall of 17 inches) and Manhattan (mean annual rainfall of 33.5 inches) Kansas. Treatments consisted of no in-season irrigation, a single in-season irrigation at one of the three different growth stages, and irrigating at each of the three selected growth stages. Selected growth stages in corn were pretassel, silk emergence, and blister; in grain sorghum they were boot, half-bloom, and soft-dough. Each irrigation was 4 inches at Manhattan and 6 inches at Tribune. All Tribune plots received a pre-plant irrigation in April of each year. Water was applied to basin plots using gated pipe. With no in-season irrigation the 3-year mean grain sorghum yields were greater than corn yields at both Manhattan and Tribune. The largest 3-year mean yield for corn receiving a single in-season irrigation was obtained with irrigation during silk emergence at both Manhattan and Tribune. Grain sorghum yields from the single in-season irrigation treatments were similar and presented no single time that tended to be superior during the three study years. Corn responded well to the three in-season irrigations. The grain sorghum yield increase for plots receiving three in-season irrigations as opposed to those receiving only one in-season irrigation is insufficient to justify the two additional irrigations.
W78-00566

PULSE IRRIGATION--DESIGN FOR OPERATING SETS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
D. Karmeli, and G. Peri.
Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, Vol. 103, No. IR1, p 33-41, March 1977. 1 fig, 3 tab, 1 ref.

Descriptors: *Irrigation efficiency, *Pumping, *Design, *Operations, Irrigation practices, Discharge(Water), Equations, Irrigation systems.
Identifiers: *Pulses, *Operating sets.

A process of design for operating sets with pulse irrigation has been developed. The process allows for an efficient operation and also adjusts the operating sets to the characteristics of the pulse as formulated in a previous work. The adjustment expresses itself mainly in the establishment of the number of stations operating with one pulsator and

in the various parameters of the pulse. The process allows for the design of a number of sets and stations when the total duration of irrigation and total number of valves in the field are given. The number of sets and stations per set must be established so as to have identical numbers of stations per set. The characteristics of the remaining stations will be different as the number is smaller and the duration time of operation is maximal. (Bell-Cornell)
W78-00631

SIGNIFICANCE OF VEGETATION IN INTERPRETING THERMAL RADIATION FROM A TERRESTRIAL SURFACE,
Florida Univ., Gainesville. Dept. of Fruit Crops.
For primary bibliographic entry see Field 7B.
W78-00694

SUGGESTED CRITERIA FOR IRRIGATION WATER INTAKES IN MISSOURI RIVER RESERVOIRS, SOUTH DAKOTA,
South Dakota State Univ. Brookings, Dept. of Civil Engineering.
For primary bibliographic entry see Field 8I.
W78-00706

STATE LEGISLATIVE RESPONSE TO THE CENTRAL ARIZONA PROJECT,
Georgia Univ., Athens.
For primary bibliographic entry see Field 6E.
W78-00707

CONTRIBUTIONS TO THE STUDY OF WATER BALANCE ELEMENTS IN THE REDDISH-BROWN SOIL AREA OF BANEASA-BUCHAREST, (IN ROMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
For primary bibliographic entry see Field 2D.
W78-00776

THE DROUGHT,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2B.
W78-00807

REGULATIVE ROLE OF TRANSPIRATION IN TEMPERATURE REGIME OF DRY FRUITS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 2D.
W78-00841

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

AN EXPERIMENT IN RECLAIMING THE FLOODPLAIN LAND, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W78-00519

PRESERVATION OF CORRELATION IN GENERATED HYDROLOGIC SAMPLES THROUGH TWO-STATION MODELS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-00531

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VII - AN INVESTIGATION OF THE VERTICAL AND HORIZONTAL HYDRAULIC CONDUCTIVITIES OF DENSE BASE COURSE AGGREGATES,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W78-00544

THE VIRGIN RIVER BASIN STUDY: A REGIONAL APPROACH TO MULTIOBJECTIVE PLANNING FOR WATER AND RELATED RESOURCES,
Nevada Univ. System, Reno. Water Resources Center.
For primary bibliographic entry see Field 6B.
W78-00551

EVALUATION OF STREAMSIDE BUFFERSTRIPS FOR PROTECTING AQUATIC ORGANISMS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W78-00553

COSTS OF ERRORS IN DEFINING A COMMUNITY'S FLOOD PLAIN,
University of Southern Mississippi, Hattiesburg. Bureau of Business Research.
For primary bibliographic entry see Field 6F.
W78-00558

BAYES DESIGN OF A RESERVOIR UNDER RANDOM SEDIMENT YIELD,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources; and Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
For primary bibliographic entry see Field 2J.
W78-00618

MARKOVIAN PROGRAMMING FOR FLOW REGULATION,
Polish Academy of Sciences, Warsaw. Inst. of Geophysics.
W. G. Strupczewski, R. J. Romanowicz, and R. J. Budzianowski.
Journal of Hydrological Sciences, Vol. 4, No. 1, p 1-16, 1977. 9 tab, 9 ref.

Descriptors: *River flow, *Reservoir operation, *Markov processes, *Linear programming, *Regulation, *Stochastic processes, Reservoir storage, Control, Probability, Reservoir releases, Inflow, Constraints, Water policy, Feasibility, Equations, Mathematical models, Systems analysis, Forecasting.

A discrete Markovian model has been defined mathematically for controlling a single storage reservoir supplied with a river flow, the model referring to an existing reservoir of a limited capacity. The stochastic character of reservoir inflows is considered by incorporation of random variables, so the problem of deriving optimal control of the reservoir is reduced to determination of the respective probability distributions for a linear model. The model variables are assumed to be discrete. The two-dimensional discrete random variable 'inflow--prediction' is called the state of the model; the transition from one state to another is determined by the transition probabilities, assuming that the random variables follow the lag-one Markov process. The loss(benefit)function determining periodical effects is the objective function of the optimization analysis. The model includes the possibility to consider the exogenic information regarding future inflows. The availability of information on the current inflow or a complete lack of this information constitute two extreme cases of the model. The linear programming model is developed wherein the decision variable is the total probability of occurrence of a certain release or storage volume. Due to the high dimensionality of the problem a dynamic model is also developed. The result is a two-level generalized reservoir model with the standard policy followed at the lower level and the unconstrained policy at the upper end. (Bell-Cornell)
W78-00621

RESERVOIR YIELD: AN IMPORTANT ENVIRONMENTAL PARAMETER,
Illinois State Environmental Protection Agency, Springfield.
L. M. Eisel.
Water Resources Bulletin, Vol. 13, No. 5, p 983-994, October 1977. 3 fig, 7 tab, 8 ref.

Descriptors: *Reservoir yield, *Reservoir storage, *Multiple-purpose reservoirs, *Simulation analysis, *Model studies, *Projects, *Water resources development, Planning, Rivers, Markov processes, Monthly, Streamflow, Estimating, Water policy, Systems analysis, California.
Identifiers: *Environmental values, *New Melones Reservoir(Cal), Stanislaus River(Cal), Disaggregation models, White water preservation, Environmental quality.

An analysis of the storage-yield relationship is utilized to help resolve conflicts between environmental values and water resources development in the New Melones Reservoir in northern California. The specific conflict exists between preservation of white water for recreational purposes and development of the site for a major multiple-purpose reservoir. A simulation model is developed to investigate the storage yield relationship; the model incorporates a lag-one Markovian flow generating model to produce annual flows which are, in turn, disaggregated into monthly flows by using a procedure developed by Valencia and Schaake in 1973. The generated monthly flows are then routed through a simple reservoir model. Results demonstrate that substantial increase in capacity of the New Melones Reservoir may produce generally modest gains in reliability; more importantly, however, the results show how relatively simple analysis could assist in quantifying trade-offs among environmental values and the products of traditional water resources development. (Bell-Cornell)
W78-00627

FEASIBILITY OF INTERBASIN WATER TRANSFER,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
G. Aron, E. L. White, and S. P. Coelen.
Water Resources Bulletin, Vol. 13, No. 5, p 1021-1034, October 1977. 5 fig, 1 tab, 15 ref.

Descriptors: *Inter-basin transfer, *Water resources, *Alternative planning, *Feasibility studies, *Water supply, *Flood protection, *Cost comparisons, Regional analysis, Economic feasibility, Hydrologic aspects, Flood control, Low-flow augmentation, River basins, Water storage, Benefits, Costs, Equations, *Reservoirs.
Identifiers: Flood skimming.

Interbasin water transfer is one of the most controversial water resources planning topics. Local communities, particularly those from which the water is to be taken (donor regions), generate enough opposition to doom many projects to failure. The opposition often arises because planners have traditionally considered excess water a free commodity rather than a marketable resource. To make transfer schemes mutually acceptable to donor and recipient regions, visible benefits must be offered. Agreement must be made on an acceptable purchase price and/or on other benefits such as a substantial amount of low flow augmentation or possibly some degree of flood control on the donor source stream. The hydrologic and economic feasibility of water transfer from the

East Susquehanna River basin to the Delaware Reservoir System for supplemental supply to the New York City area has been investigated. Nine alternative schemes for diversions up to 400 cfs and compensations in the form of low flow augmentation and/or flood control were considered resulting in unit costs to the recipient region between $90 and $380/mg. If only the minimum state-mandated flow is released to the Susquehanna River, the savings to the water recipients would be sufficient to pay a purchase price of about $21/mg, which would be equivalent to a total amount of $420,000/year for an average export of 100 cfs. (Bell-Cornell)
W78-00628

PULSE IRRIGATION--DESIGN FOR OPERATING SETS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W78-00631

MODELS FOR OPTIMIZING THE MULTIPURPOSE OPERATION OF A RESERVOIR SYSTEM,
Texas Univ. at Austin. Center for Research in Water Resources.
L. R. Beard.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975, IAHS-AISH Publication No. 115, p 13-21, 1975. 1 fig, 6 tab.

Descriptors: *Multiple-purpose reservoirs, *Simulation analysis, *Operations research, *Flood control, *River basins, Recreation, Navigation, Optimization, Evaluation, Water supply, Low flow, Regulation, Reservoir storage, Reservoir releases, Benefits, Monthly, Computer programs, Hydrology, Flow.
Identifiers: *Arkansas River basin, Operating rules, Power generation, Benefit maximization.

Two comprehensive hydrological and water resource management models are used to optimize the operation of 16 reservoirs in the Arkansas River basin for flood control, power generation, recreation and navigation. The primary, system model simulates and evaluates the operation of a reservoir system on a monthly basis for water supply, low flow regulation, power generation and recreation, with storage and release constraints for flood control. The catchment model simulates and evaluates the operation on a short-time basis during flood periods of a water resource system for flood control. The study to improve system operation provides for minimum acceptable accomplishments for each purpose and then maximizes the overall system accomplishments for all purposes. The catchment model establishes the values of various amounts of empty space available for flood control at the start of each calendar month. These values and benefit functions for the other purposes are then used in the system model for optimizing operation rules. Results show that existing operation rules are very close to optimum, but because of the importance of the projects, the relatively minor improvements devised herein would produce very large benefits. (See also W77-10419) (Bell-Cornell)
W78-00634

HYDROLOGICAL SYSTEM RELIABILITY AT THE CONFLUENCE OF RIVERS,
Water Resources Centre, Budapest (Hungary).
I. Bogardi, L. Duckstein, and F. Szidarovszky.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IASH-AISH Publication No. 115, International Association of Hydrological Sciences, p 36-44, 1975. 7 fig, 1 tab, 7 ref.

Descriptors: *Hydrologic systems, *Rivers, *Flood protection, *Economic efficiency, *Backwater, Effects, Tributaries, Water levels, Reach(Streams), Estimating, River beds, Flood plains, Probability, Optimization, Decision making, Hydraulic models, Numerical analysis, Mathematical models, Equations, Systems analysis.
Identifiers: System reliability, Cost minimization, Linear regression model, Natural uncertainty, Parameter uncertainty, Levee systems, Central Hungary, Cost functions, Lossfunctions, Levee failure.

The protection of a system of hydrological structures under random load conditions is examined using flood protection at the confluence of a tributary and a main water body (river, lake, or sea) as an example. Given a sample pair (h(1), h(n)) of water levels at both ends of the investigated reach, the corresponding backwater curve is calculated. Estimation of friction parameters of the river bed and flood plain is performed by model calibration. A linear regression of water level at any given cross section on (h(1), h(n)) is used to calculate the reliability of the total system. A probabilistic systems approach insures that the dependence between the resistance of the various structures is taken into account. The model has been designed to include both natural uncertainty and sample or parameter uncertainty. Use of the model to optimize system reliability and the optimum development of the levee system along the confluence of a tributary and a main river in central Hungary is calculated. The model may be used ceteris paribus whenever the joint probability distribution function of (h(1), h(n)) is normal or lognormal. (See also W77-10419) (Bell-Cornell)
W78-00637

SIMULATION MODELS OF THE VELIKA MORAVA BASIN FOR DESIGN OF A MULTIPURPOSE RESERVOIR SYSTEM,
Institut za Vodoprivredu Jaroslav Cerni, Belgrade (Yugoslavia).
B. Djordjevic, S. Jovanovic, S. Opricovic, and S. Simonovic.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, p 85-94, 1975. 9 fig, 2 ref.

Descriptors: *Multiple-purpose reservoirs, *Flood control, *Simulation analysis, *Computer models, *Flood routing, Planning, River basins, Design, Reservoir storage, Rainfall, Runoff, Hydrographs, Optimization, Equations, Flow, Systems analysis.

A system of multipurpose reservoirs has been planned for the Velika Morava basin (Yugoslavia) which will have sufficient spare capacity to enable the reservoirs to perform an important flood control function. In order to design the flood storage volumes required, programs were set up for two simulation models: (1) a model to generate floods in the Velika Morava basin from simulated precipitation in the catchment area; and (2) a model incorporating the 18 reservoirs for flood routing analysis. The optimalization problem was formulated as follows: design the reservoir system such that under optimal control, design flood waves will undergo routing in the free storage volumes such that at downstream monitoring points the maximum discharge rate will always remain less than a certain given value. The entire simulation procedure considered herein goes very quickly on a modern computer enabling one to examine a large number of alternative configurations, solve optimal design problems, examine system behavior for a large number of hypothetical unfavorable hydrological situations, and work out an optimal control strategy. (See also W77-10419) (Bell-Cornell)
W78-00639

THE CALCULATION OF WATER SHORTAGE INDICES BY USING INFORMATION ABOUT THE CONCOMITANCE OF WATER RESOURCES AND DEMANDS,
Research Inst. for Water Resources Development. Budapest (Hungary).
For primary bibliographic entry see Field 6D.
W78-00640

CHANCE CONSTRAINED MODEL OF WATER RESOURCES SYSTEMS,
Water Resources Development and Construction, Prague (Czechoslovakia).
Z. Kos.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September '75. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, 1975, p 143-148. 1 tab, 15 ref.

Descriptors: *Water resources, *Reservoir operation, *Rivers, *Linear programming, *Multiple-purpose reservoirs, Simulation analysis, Optimization, Stochastic processes, Demand, Probability, Investment, Economic efficiency, Hydrologic aspects, Mathematical models, Systems analysis.
Identifiers: *Chance-constrained programming, *Odra River(Czechoslovakia).

In this article, the applications of chance-constrained programming to water resources systems in Czechoslovakia are reviewed, and the advantages and drawbacks of reservoir operation based on linear decision rules are described. An altered problem statement for linked reservoir systems resulting from omitting the linear decision rules in the model is shown relating stochastic demands and probabilistic evaluation of a water resources system to Czechoslovak standards. Discussed are the utilization of the chance-constrained model in a study of the water resources in the catchment of the Odra River and a comparison of the study results with those obtained using a simulation model. The linear objective function of the chance-constrained model was to minimize the total investment in new reservoir capacities operating in the water resources system with existing reservoirs. The comparison of the resulting probabilities with the simulation model shows no statistically significant differences. However, the chance-constrained model is simpler and the standard probabilities can be set as input of the model rather than seeking them as output as is done in the simulation model. (See also W77-10419) (Bell-Cornell)
W78-00641

GENERAL MARKOV MODEL FOR OPTIMAL CONTROL RESERVOIRS,
Polish Academy of Sciences, Warsaw. Inst. of Geophysics.
W. G. Strupczewski, R. J. Kiczko, and R. J. Budzianowski.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September '75. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, 1975, p 222-230. 4 tab, 8 ref.

Descriptors: *Reservoirs, *Flood control, *Markov process, *Stochastic processes, *Linear programming, *Dynamic programming, Optimization, Inflow, Summer, Probability, Rivers, Reservoir storage, Water policy, Equations, Mathematical models, Systems analysis.
Identifiers: Maximization, Prediction.

Described is a general stochastic model of a single reservoir and its application for the optimal control of one of the Carpathian reservoirs during the summer flood season. The model makes use of the exogenic information about the nearest inflow. It

is assumed that the inflow and its prediction form a twoedimensional first-order Markov chain. The linear programming model and the dynamic programming model for solving the dual problem are described. By introducing a two-level control policy, there is no need to determine the feasible control region since that region may not exist for the discharge as a control for the finite reservoir when the distance between the inflow probability distribution boundaries is too big. Feasible controls are introduced into the periodic objective functions and into the reservoir balance equation. Analyzed is the influence of the two-level controls on the shape of the total expected return functions for the dynamic programming problem with the convex objective function. The objective function is the maximization of the expected storage level at the end of the flood season while keeping the risk of the flood below the permissible probability. A simple example illustrates the use of the two-level regulation for theoptimal control of reservoirs. (See also W77-10419) (Bell-Cornell)
W78-00642

MULTIPLE OBJECTIVE OPTIMIZATION MODEL FOR REAL-TIME OPERATION OF A WATER SUPPLY SYSTEM,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
P. E. Flatt, and C. D. D. Howard.
In: Large Engineering Systems: Proceedings of the International Symposium on Large Engineering Systems, University of Manitoba, Winnipeg, Canada, Aug. 9-12, 1976. Alvin Wexler (Ed.), Pergamon Press, Inc., Oxford, United Kingdom, p 214-223, 1977. 3 fig.

Descriptors: *Water supply development, *Linear programming, *Water allocation(Policy), *Economic efficiency, Optimization, Reservoirs, Rivers, Constraints, *Computer models, Municipal water, Industrial water, Simulation analysis, Reservoir releases, Decision making, Fish, Flow, Demands, Spawning, Operations research.
Identifiers: *Real-time operation, *Seattle(Washington), Multiple objectives, Benefit maximization.

Described are the details of a linear programming model and its current application to the real-time operation of Seattle's water supply system. Since 1973 the model has been used by the Seattle Water Department for the management of two water supply reservoirs and it is one of a hierarchy of models used for this purpose. The four monthly operational objectives considered by the model are: (1) Seattle's municipal and industrial demands; (2) hydro-electric power requirements; (3) fish flow requirements on the Cedar River; and (4) fish flow requirements of the Tolt River. Relative values for these elements of the objective function are defined at run-time; the importance of alternative sets of values to reservoir operations depends on the current state of the physical systems. Constraints reflect both physical considerations and operational aspects, including those considerations not explicitly modeled. The (LP) linear programming model is used in conjunction with a simulation model. The operating policy determined by the optimization model is simulated to estimate the probable outcome of the policy. The objective function is to maximize the value of allocated water to the specified demands. The model is practical and includes extensive data management capabilities; execution time is a few seconds on a CDC6500 computer. (Bell-Cornell)
W78-00645

HIERARCHICAL MULTIPLE OBJECTIVE ANALYSIS OF LAND AND WATER RESOURCE UTILIZATION FOR A SYSTEM OF LAKES,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
C. D. D. Howard, and U. Shamir.
In: Large Engineering Systems: Proceedings of the International Symposium, University of Manitoba, Winnipeg, Canada, Aug. 9-12, 1976. Alvin Wexler (Ed.), Pergamon Press, Inc., Oxford, United Kingdom, p 596-609, 1977. 2 fig, 1 tab.

Descriptors: *Water resources, *Land resources, *Lakes, *Water utilization, *Watershed management, *Linear programming, Analytical techniques, Constraints, Simulation analysis, Computer programs, Computer models, Decision making, Water balance, Optimization, Mathematical models, Systems analysis, Equations.
Identifiers: *Multiple objectives, *Hierarchical analysis, Data management, Report generation, Edmonton(Canada), Benefit measurement.

Described is an interrelated land and water resource management problem along with a set of computer and mathematical models which were developed for its analysis. A small system of several lakes near Edmonton, Canada, for which precipitation and evaporation are closely balanced and water quality is poor, was the subject of numerous studies and public hearings. The goal of the modeling effort was to provide a method for comparing sets of weighted objectives for the management of the watersheds. This was accomplished using a deterministics linear programming model having a sum of weighted objectives subject to various constraints. This model was supported by a simulation model and other models of physical processes. Data management and report generation were emphasized to facilitate utilization throughout a process of land and water use plan formulation. The models have not yet been extensively used. (Bell-Cornell)
W78-00646

OMNIBUS WATER RESOURCES DEVELOPMENT ACT OF 1976.
For primary bibliographic entry see Field 6E.
W78-00650

WESTWIDE STUDY (CRITICAL WATER PROBLEMS FACING THE ELEVEN WESTERN STATES).
Bureau of Reclamation, Washington, DC.
Journal of the American Water Works Association, Vol. 68, No. 3, p. 117-122, March 1976.

Descriptors: *Water shortage, *Water sources, *Water conservation, *Water yield improvement, *Water management(Applied), Water pollution, Water zoning, Legal aspects, Groundwater basins, Water supply development, Water utilization, Competing uses, Water reuse, Water supply, Planning, Bodies of water, Surface waters, Arid lands, Weather modification, Southwestern states, Human population, Growth rates, Energy, Water rights.

Man's activities have caused heavy depletion of the water supply in the eleven Western states. Most of the surface water in this area has been or will be consumed by the year 2000. However, ground water supplies have not been widely utilized because of inadequate information. Complicating the water problem is an expected population increase at a rate more than twice that of the rest of the nation. Because the West contains the most undeveloped energy resources, solving the problems of water quantity and quality is imperative. In addition, the need for water for small communities and Indian reservations must be met. As the waters of the West are committed, the potential for meeting water demands through conservation and reuse becomes more important. Increasing the water supply by changing the weather artificially is possible, but the legal aspects of precipitation management are very complex. Total water management, involving both water quantity and quality is necessary to meet the current and future demands. As western water is dedicated to use, total water management by state and federal agencies should be the goal. (See also W76-00716) (Maas-Florida)
W78-00663

DRAINAGE FLUX IN PERMEABLE SOIL UNDERLAIN BY A COARSE-TEXTURED LAYER,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W78-00675

CHISELING INFLUENCES ON SOIL HYDRAULIC PROPERTIES,
Agricultural Research Service, Pendleton, OR. Columbia Plateau Conservation Research Center.
For primary bibliographic entry see Field 2G.
W78-00678

A TEST FOR DISTINGUISHING BETWEEN EXTREME VALUE DISTRIBUTIONS,
Otago Univ., Dunedin (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2E.
W78-00681

A REGISTRATION UNIT FOR DRAIN OUTFLOW, GROUNDWATER DEPTH AND PRECIPITATION,
Institute for Land and Water Manage Research, Wageningen (Netherlands).
For primary bibliographic entry see Field 7B.
W78-00682

LAND DRAINAGE IN ENGLAND AND WALES,
Ministry of Agriculture, Fisheries and Food, London (England).
G. Cole.
Journal of the Institution of Water Engineers, Vol. 30, No. 7, p 345-367, October 1976. 6 fig, 23 ref.

Descriptors: *Drainage, *Watersheds(Basins), *Organizations, Drainage programs, Flood control, History, Hydrology, Oceanography, Planning, Social aspects, Land management, Methodology, Planning, Tidal waters, Flood protection, Warning systems, Land subsidence, Engineering, Design, Foreign countries, Tile drains.
Identifiers: *England, *Wales, Water authorities.

The nature of land drainage and its history were outlined in this paper. The social and economic importance of land drainage were described and compared with the other functions of water authorities. The paper also: summarized developments in design, construction and maintenance since 1954; referred to the reasons for agricultural support and hence for the encouragement of land drainage; mentioned the unity of agricultural drainage and urban flood protection; set out objectives for the future and suggested how they might be achieved. (Humphreys-ISWS)
W78-00691

EFFECTS OF VARYING DISCHARGE REGIMES ON BED-FORM SEDIMENTARY STRUCTURES IN MODERN RIVERS,
Keele Univ. (England). Dept. of Geology.
For primary bibliographic entry see Field 2J.
W78-00696

STEADY INFILTRATION FROM A DITCH: THEORY AND EXPERIMENT,
Karadeniz Teknik Univ., Trabzon (Turkey). Dept. of Civil Engineering and Architecture.
V. Batu.
Soil Science Society of America Journal, Vol. 41, No. 4, p 677-682, July-August 1977. 8 fig, 12 ref.

Descriptors: *Infiltration, *Ditches, *Model studies, *Laboratory tests, Mathematical models, Hydraulic conductivity, Flow, Steady flow, Soil water, Soil water movement, Moisture content, Distribution patterns, Soil physics, Soil science.
Identifiers: Soil water potential, Unsaturated soils, Water content distribution.

The two-dimensional, steady-state water flow equation, which is based on the assumption that the hydraulic conductivity is an exponential function of the soil water pressure, was solved for a ditch on the soil surface. The results included expressions describing the distributions of matric flux potential and water content. Measured water contents were compared with this mathematical model and with other models. (Sims-ISWS)
W78-00708

AERATION OF HYDRO RELEASES AT FT. PATRICK HENRY DAM,
Tennessee Valley Authority, Chattanooga. Water Quality and Ecology Branch.
For primary bibliographic entry see Field 5G.
W78-00711

HYDRODYNAMIC PRESSURE IN SEMICYLINDRICAL RESERVOIR,
Universidad Nacional Autonoma de Mexico, (Mexico). Inst. de Ingenieria.
For primary bibliographic entry see Field 8B.
W78-00714

UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT AND WATER MANAGEMENT IN NORTH CAROLINA,
North Carolina State Univ. at Raleigh. Dept. of Geosciences.
For primary bibliographic entry see Field 7B.
W78-00715

WATER CONDITIONS AND FLOOD EVENTS IN CALIFORNIA, WATER YEAR 1975-76.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2E.
W78-00718

EYEBROOK RESERVOIR SIPHON SPILLWAY - PAPER II,
For primary bibliographic entry see Field 8B.
W78-00743

NEW ENGLAND RIVER BASINS COMMISSION FINDINGS AND RECOMMENDATIONS ON THE CONNECTICUT RIVER BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION.
New England River Basins Commission, Boston, MA.
For primary bibliographic entry see Field 6B.
W78-00746

AN ASSESSMENT METHODOLOGY FOR THE ENVIRONMENTAL IMPACT OF WATER RESOURCE PROJECTS,
Battelle Columbus Labs., OH.
For primary bibliographic entry see Field 6G.
W78-00750

FLOOD PLAIN INFORMATION: COTTONWOOD CREEK, EL PASO COUNTY, COLORADO.
Army Engineer District, Albuquerque, NM.
Prepared for Pikes Peak Area Council of Governments, September 1976. 31 p, 4 fig, 25 plates, 4 tab.

Descriptors: *Colorado, *Flood data, *Peak discharge, *Flood plains, *Flood protection, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Floo frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plain zoning, Building codes, Land use, Planning, Zoning, Control structures, Levee, Standard Project Flood.
Identifiers: El Paso County(CO), *Cottonwood Creek(CO), Intermediate Regional Flood.

The study area includes Cottonwood Creek from its confluence with Monument Creek to a point one mile upstream from Black Forest Road, all of which lies in El Paso County, Colorado, north of Colorado Springs. The lower reaches of Cottonwood are heavily developed, and the development is moving upstream. Some flood protection measures have been taken, such as construction of a reataining wall and levees of sand and gravel. No stream gages exist on Cottonwood Creek and few other references exist. The maximum estimated discharge in the adjacent Templeton Gap Floodway Basin is 9,700 cubic feet per second (cfs). The main flood season is April through September and results from snowmelt, rainfall, or both. Floods from similar basins in the area have high peak flows, moderate volumes and short duration. In the stream reach from Monument Creek and Academy Boulevard, the Intermediate Regional Flood (IRF) is expected to discharge from 19,420 to 20,350 cfs while the Standard Project Flood (SPF) will discharge from 35,300 to 37,000 cfs. In the stream reach from Cowpoke Road to Black Forest Road, the IRF discharge will be from 5,000 to 7,650 cfs, while the SPF discharge will be from 9,100 to 13,900 cfs. The data contained in this study are intended as an aid in on-going flood control efforts and guidelines for flood plain management are presented. (Nessa-NC)
W78-00757

SPECIAL FLOOD HAZARD INFORMATION REPORT: CONGAREE RIVER, BROAD RIVER, AND SALUDA RIVER, RICHLAND AND LEXINGTON COUNTIES, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
Prepared for the Central Midlands Regional Planning Council, June 1974, 19 p, 42 plates, 7 tab.

Descriptors: *South Carolina, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flood duration, Stage-discharge relations, Flood plains, Flood protection, Flood plain zoning, Land use, Planning, Zoning.
Identifiers: Richland County(SC), Lexington County(SC), *Congaree River(SC), *Broad River(SC), *Saluda River(SC), 500-year flood, 100-year flood.

The study area includes the portions of Richland and Lexington Counties, South Carolina, that are subject to flooding from the Broad, Saluda, and Congaree Rivers. Flood plain uses vary from concentrated residential and commercial to heavily wooded swampland. Flood data were obtained from 5 U.S. Geological Survey (USGS) gaging stations, topographic maps and field surveys. Two reservoirs operated for hydropower generation provide temporary floodwater storage. The reservoirs are lowered to maximum operating pool levels as soon as possible after storm events. The main flood season occurs from late spring to early fall and is caused by heavy rainfall. The worst flood for which complete data are available occurred in October of 1929, cresting at 150.1 feet mean sea level (msl) on the Congaree River at Gervais Street, 164.7 feet msl on the Saluda at the USGS gage, and 171.0 feet msl at the Columbia Canal Diversion Dam. The 100-year flood is expected to crest at 156.5, 169.0, and 170.7 feet msl, respectively at the same locations, while the 500-year flood would crest at 169.3, 173.8, and 179.6 feet msl, respectively. This study is intended for use in developing a floodway zoning plan and in implementing existing subdivision regulations. (Nessa-NC)
W78-00758

FLOOD PLAIN INFORMATION: STONEY BRANCH AND TRIBUTARIES, ROCK HILL, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
Prepared for City of Rock Hill, SC. August 1974, 26 p, 11 fig, 14 plates, 8 tab.

Descriptors: *South Carolina, *Indirect flood measurement, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Flood flow, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard project flood, Land use, Planning.
Identifiers: Rock Hill(SC), *Stoney Branch(SC), Intermediate Regional Flood.

The study area consists of the southwest portion of the City of Rock Hill and the adjacent area of York County which are subject to flooding from Stoney Branch and three of its unnamed tributaries. Some stretches of the flood plain are substantially developed while other stretches are relatively undeveloped. Streamflow records were unavailable for the study area. Discharge frequency relationships were based on regional data or records collected on similar streams from U.S. Geological Survey (USGS) gages. Newspaper files and topographic maps were also data sources. Major floods occur from June through September and are caused by tropical storms. Heavy local rains can cause flooding in the early spring and late fall. Little data exist to establish the severity of past floods. A recent severe flood occurred in August 1970, cresting at 536.6 feet mean sea level (msl) at College Downs. At the same location, the Intermediate Regional Flood would crest at 537.4 feet msl while the Standard Project Flood would crest at 540.2 feet msl. Several bridges and culverts create obstructions to floodflow. No flood control improvements exist in the study area. The data produced by this study are intended for use in developing flood plain management regulatory measures. (Nessa-NC)
W78-00760

FLOOD PLAIN INFORMATION: EAST RIVER AND TRIBUTARIES, CITY OF GREEN BAY AND BROWN COUNTY, WISCONSIN.
Army Engineer District, Chicago, IL.
Prepared for City of Green Bay and Brown County Regional Planning Commission, March 1972, 68 p, 24 fig, 32 plates, 15 tab.

Descriptors: *Wisconsin, *Flood data, *Peak discharge, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood stages, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood, Warning systems, Land use, Planning, Control structures, Dikes.
Identifiers: Green Bay(WI), *East River(WI), Brown County(WI), Baird Creek(WI), Bower Creek(WI), Intermediate Regional Flood.

The study area includes the East River, Bower Creek, and Baird Creek in the City of Green Bay and Brown County, Wisconsin. Extensive residential, commercial and industrial land uses occupy the East River and Baird Creek flood plains, while the Bower Creek flood plain is mostly in agricultural use. Flood data were obtained from two stream gages on the East River, newspaper files, historical documents, and field investigations. No reliable data on floods on Baird and Bower Creek were found. The main flood season occurs from April through June and results from rainfall, snowmelt, or both. Intense local thunderstorms may cause flooding at any time. The worst flood of record on the East River measured at the Grove Street gage occurred on Februaty 10, 1966, discharging 5,500 cubic feet per second (cfs). At the same location, the Intermediate Regional Flood (IRF) is expected to discharge 7,800 cfs, while the Standard Project Flood (SPF) will discharge 23,300 cfs. The IRF at the mouths of Baird and Bower Creeks would discharge 2,400 cfs and 4,000 cfs, respectively, while the SPF discharge at the same location would be 7,100 cfs and 12,100 cfs, respectively. Two bridges across the East River would be inudated by the SPF, as would several major roads. There are no major ob-

structions on Bower Creek, but several bridges present obstruction hazards on Baird Creek. Channel improvement would provide faster discharge of smaller floods. (Nessa-NC)
W78-00761

FLOOD PLAIN INFORMATION: MENOMINEE RIVER--GREEN BAY, MARINETTE COUNTY, WI, MENOMINEE COUNTY, MI, CITIES OF MARINETTE, WI--MENOMINEE, MI.
Army Engineer District, Chicago, IL.
Prepared for East Central Wisconsin Regional Planning Commission, January 1975, 35 p, 17 fig, 16 plates, 9 tab.

Descriptors: *Wisconsin, *Michigan, *Flood data, *Peak discharge, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood, Land use, Planning.
Identifiers: *Menominee River(WI and MI), Green Bay(WI), Marinette(WI), Menominee(MI), Marinette County(WI), 500-year flood, Intermediate Regional Flood, Meominee County(MI).

The study area includes the portions of Marinette County, Wisconsin, and Menominee County, Michigan, and the cities of Marinette, Wisconsin, and Menominee, Michigan subject to flooding from the Menominee River and its terminus, Green Bay, which is contiguous with Lake Michigan. The drainage area at the terminus is 4,070 square miles. Land uses along the waterways are residential, commercial, industrial, agricultural and recreational. Flood data were obtained from 6 gaging stations on the river and bay, newspaper files, historical documents, topographic maps and field surveys. Flooding occurs year round on the river, resulting from rain, snowmelt, or both. Flooding on the bay results from long term precipitation cycles, short term precipitation excesses, and seasonal precipitation patterns. The worst flood of record on the Menominee, measured at the McAllister gage, occurred on May 9, 1960, cresting at 650.0 feet mean sea level (msl). The worst flood of record on Green Bay at the mouth of the Menominee occurred on April 9, 1973, cresting at 584.20 feet msl. At this location, the Intermediate Regional Flood (IRF) will discharge 41,000 cubic feet per second (cfs) and crest at 584.40 msl, while the Standard Project Flood would discharge 79,000 cfs. At mile 3.61, the Menominee's IRF discharge would be 40,800 cfs, and the SPF discharge would be 78,700 cfs. (Nessa-NC)
W78-00762

FLOOD PLAIN INFORMATION: BEAVER CREEK AND TRIBUTARIES, VICINITY OF HUNTINGTON, TENNESSEE.
Army Engineer District, Memphis, TN.
Prepared for City of Huntington, TN, September 1971, 36 p, 7 fig, 17 plates, 11 tab.

Descriptors: *Tennessee, *Indirect flood measurement, *Flood data, *Peak discharge, Floods, Flooding, Flood flow, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood stages, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood.
Identifiers: Huntington(TN), *Beaver Creek(TN), Brier Creek(TN), Poison Branch(TN), Intermediate Regional Flood.

The study area involves Beaver Creek from mile 2.65 upstream to mile 9.00, Brier Creek from the mouth upstream to mile 1.33, and Poison Branch from the mouth upstream to the County Road bridge at mile 1.26, and includes the City of Huntington. Some developments exist in the flood plain. Present trends indicate that flood plain sites will be increasingly attractive to developers. Several bridges would be overtopped by the Intermediate Regional Flood (IRF). Flood data were obtained from local rainfall and runoff information, historical and current flood heights, and the U.S. Geological Survey (USGS) stream gage on Beaver Creek. Flooding has occurred from September through June and results from heavy general rainfall. The worst flood of record occurred on September 9, 1970, discharging 8,500 cubic feet per second (cfs) and cresting at 378.16 feet mean sea level (msl) at the Beaver Creek gage. This flood is equivalent to the Intermediate Regional Flood (IRF). The Standard Project Flood (SPF) is expected to discharge 16,500 cfs and would crest at 380.66 feet msl. Pertinent data regarding flood effects on the other streams in the study area are also provided. Substantial flood damages have occurred in the past. More extensive damages would result from the SPF. (Nessa-NC)
W78-00763

NORTH FORK OBION RIVER, HOOSIER CREEK, AND GROVE CREEK, UNION CITY, TENNESSEE.
Army Engineer District, Memphis, TN.
Prepared for City of Union City, TN, November 1968, 63 p, 9 fig, 21 plates, 16 tab.

Descriptors: *Tennessee, *Flood data, *Peak discharge, *Planning, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood.
Identifiers: Union City(TN), *Hoosier Creek(TN), *Grove Creek(TN), *North Fork Obion River(TN), Intermediate Regional Flood.

Union City, Tennessee, is located northwest of the North Fork Obion River and between Hoosier Creek on the west and Grove Creek on the east. Several tributaries to these creeks are also included in the study area. Residential, commercial, and industrial developments are found on the flood plains of all of the waterways studied. Flood data were obtained from U.S. Geological Survey (USGS) stream gages, newspaper files and historical records. The main flood season is winter and spring, although large floods caused by heavy local rains may occur any time, especially on the small streams. The largest flood of record on the North Fork Obion River, measured at the State Highway 22 bridge gage, occurred on January 22, 1937, and crested at 308.88 feet mean sea level (MSL) with a peak discharge of 49,200 cubic feet per second (cfs). At the same location, the Intermediate Regional Flood (IRF) is expected to discharge 58,000 cfs, while the Standard Project Flood would discharge 80,000 cfs. Historical and future flood profiles are also provided for the other streams in the study area. The data in this study are intended for use in developing nonstructural control measures such as flood plain zoning, and structural control measures where necessary. (Nessa-NC)
W78-00764

FLOOD PLAIN INFORMATION: SUGAR CREEK, LITTLE NIXON CREEK, AND TRIBUTARIES, VICINITY OF BROWNSVILLE, TENNESSEE.
Army Engineer District, Memphis, TN.
Prepared for City of Brownsville, TN, March 1975, 27 p, 17 fig, 18 plates, 5 tab.

Descriptors: *Tennessee, *Flood forecasting, *Flood data, *Peak discharge, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Design flood, Historic floods, Flood frequency, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood.
Identifiers: Brownville(TN), *Sugar Creek(TN), *Little Nixon Creek(TN), Sugar Creek Lateral(TN), Little Nixon Creek Lateral(TN), Buck's Creek(TN), Buck's Creek Lateral(TN), Intermediate Regional Flood.

The study area involves two small watersheds. One is drained by Sugar Creek and its tributary, Sugar Creek Lateral. The other watershed is drained by Little Nixon Creek and its tributaries, Little Nixon Creek Lateral, Buck's Creek, and Buck's Creek Lateral. Brownsville, Tennessee is bisected by the divide separating these two watersheds. Limited residential and commercial development has taken place on these flood plains. Flood data were obtained from newspaper files, 1971 aerial photographs, and field surveys. There are no stream gages in the study area. Flooding occurs at any time of year. Historical flood data were difficult to obtain. Local residents provided information on high water marks. At the mouth of Sugar Creek, the Intermediate Regional Flood (IRF) is expected to discharge 7,500 cubic feet per second (cfs) while the Standard Project Flood (SPF) is expected to discharge 15,000 cfs. At the downstream study area boundary, Little Nixon Creek would discharge 4,600 cfs in the IRF, and 9,200 cfs in the SPF. Most of the 32 bridges and culverts in the study area are obstructive to the IRF and SPF. This study will provide Brownsville with the data necessary to develop flood plain management regulartory measures. (Nessa-NC)
W78-00765

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, ASHLAND CITY, TENNESSEE.
Army Engineer District, Nashville, TN.
Prepared for Town of Ashland City, TN, April 1970, 29 p, 4 fig, 11 plates, 7 tab.

Descriptors: *Tennessee, *Flood forecasting, *Flood data, *Peak discharge, Floods, Flood flow, Indirect flood measurement, Maximum probable flood, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Control structures, Reservoirs, Standard Project Flood.
Identifiers: Ashland City(TN), *Cumberland River(TN), Intermediate Regional Flood.

The study area involves an 11 mile reach of the Cumberland River, extending approximately 6 miles upstream and 5 miles downstream from Ashland City, Tennessee. There are some commercial, residential, and industrial developments on the flood plain. Flood data were obtained from stream gages that have been operated periodically at various locations in Ashland's general vicinity. A profile of the past and future flood situation was developed by combining the data recorded at these gages with future flood projections. The main flood season occurs from December through April, although summertime flooding can occur as a result of heavy general rains. The worst flood of record occurred on January 24, 1937, cresting at 406.4 feet mean sea level (MSL) at the Tennessee Highway 49 bridge in Ashland. At this location the January 1-2, 1927 flood crested at 406.0 feet. In the upper two miles of the study reach, the 1927 flood was higher than the 1937 flood. Four flood control reservoirs have been constructed in the study area since 1943. The Intermediate Regional Flood is expected to crest at 397.6 feet MSL at the Highway 49 bridge, while the Standard Project Flood would crest at 409.4 feet MSL, discharging 120,000 cfs and 180,000 cfs, respectively. (Nessa-NC)
W78-00766

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, CANEY FORK RIVER, CARTHAGE, TENNESSEE.
Army Engineer District, Nashville, TN.
Prepared for Carthage, TN, April 1967, 50 p, 5 fig, 12 plates, 3 tab.

Descriptors: *Tennessee, *Flood data, *Peak discharge, *Non-structural alternatives, *Land use, Floods, Flood flow, Flood forecasting, Historic floods, Flood frequency, Flood peak, Flood plains, Standard Project Flood, Flood protection, Warning systems, Building codes, Planning, Zoning, Control structures, Levee,

Dikes, Floodwalls, Dams, Reservoirs, Channel improvement.
Identifiers: Carthage(TN), *Cumberland River(TN), *Caney Fork River(TN), Flood plain management, Subdivision regulations, Encroachment lines, Intermediate Regional Flood.

The study area involves 8 miles of the Cumberland River and 3.5 miles of the Caney Fork River, and includes the Town of Carthage, Tennessee. 3,325 acres of land in the study area are affected by the Standard Project Flood (SPF). Sixty-five percent of this land is devoted to agriculture. The floodplain lands devoted to agriculture in Carthage are rapidly being converted to urban uses. Flood data were obtained from U.S. Weather Bureau precipitation records, which are continuous from 1889; and stream gage records of the Weather Bureau dating from 1885; and from the U.S. Geological Survey (USGS) dating from 1922. The main flood season extends from early December through April and results from heavy general rains. The Cumberland's maximum recorded discharge of 210,000 cubic feet per second (cfs) at Carthage occurred on December 30, 1926, which is prior to construction of several upstream regulating reservoirs. The peak discharge since completion of the reservoirs is 104,000 cfs and occurred in March 1962. The discharge rates recorded for the 1926 and 1962 floods are the same as that expected for the SPF. The flood crested 1.5 feet lower in 1962 than in 1926 because of flood control measures. Additional structural and non-structural flood controls are described, and guidelines are presented for floodplain management. A selected bibliography is included. (Nessa-NC)
W78-00767

FLOOD PLAIN INFORMATION: SULPHUR FORK, SPRINGFIELD, TENNESSEE.
Army Engineer District, Nashville, TN.
Prepared for City of Springfield, Tennessee, August 1972. 29 p, 13 fig, 8 plates, 6 tab.

Descriptors: *Tennessee, *Flood data, *Flood stages, *Peak discharge, Floods. Flood flow, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood.
Identifiers: Springfield(TN), *Sulphur Fork(TN), Intermediate Regional Flood.

The study area involves 8.6 miles of Sulphur Fork, a tributary of the Red River, including the City of Springfield, Tennessee. A few small concentrations of residential and commercial developments and public works projects interrupt the agricultural use of the flood plain. Flood data were obtained from a U.S. Geological Survey (USGS) gage maintained since 1938, located downstream from the study area, newspaper files, and historical records. The main flood season occurs from December through April and is caused by heavy general rains. The worst known flood as measured at the gage downstream from the study area, occurred in June, 1934, cresting at 449.0 feet mean sea level (MSL). The flood's peak discharge is unknown. Another serious flood occurred on February 27, 1962, cresting at 447.1 feet MSL and discharging 13,700 cubic feet per second (cfs). The Intermediate Regional Flood (IRF) is expected to crest at 551.0 feet MSL and discharge 19,000 cfs upstream from the Springfield water works. At the same location, the Standard Project Flood will crest at 558.3 feet MSL and discharge 42,500 cfs. Six bridges form the principal obstructions to flood flows. There are no structural or non-structural flood control measures in or affecting the study area. (Nessa-NC)
W78-00768

FLOOD PLAIN INFORMATION: BLACK EARTH CREEK, DANE COUNTY, WI-VILLAGES OF MAZOMANIE, BLACK EARTH, AND CROSS PLAINS.
Army Engineer District, St. Paul, MN.
Prepared for Dane County Regional Planning Commission, November 1974, 26 p, 16 fig, 17 plates, 7 tab.

Descriptors: *Wisconsin, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood, Land use, Planning.
Identifiers: Dane County(WI), Black Earth(WI), Mazomanie(WI), Cross Plains(WI), *Black Earth Creek(WI), Intermediate Regional Flood.

The Black Earth Creek study area extends for 22 miles from the west Dane County, Wisconsin, line, through the villages of Mazomanie and Black Earth to 3 miles east of Cross Plains. Flood plain uses within the villages are primarily residential, commercial, and light industrial. Agricultural uses predominate outside the villages. Flood data were obtained from the stream gages maintained in Black Earth since 1954, newspaper files, historical records, topographic maps, aerial photographs and field surveys. Flooding occurs year round, although the main flood season is spring and summer, resulting from rainfall, snowmelt, or both. The worst flood recorded at the Black Earth gage occurred on July 3, 1954, cresting at 819.53 feet mean sea level (msl) and discharging 1,750 cubic feet per second (cfs). Other large floods have occurred in 1957, 1959 and 1960. At the same location, the Intermediate Regional Flood (IRF) is expected to crest at 822.0 feet msl and discharge 3,100 cfs, while the Standard Project Flood will crest at 825.9 feet msl and discharge 23,100 cfs. Twenty-two of the 29 bridges in the study area would be overtopped by the IRF. The data contained in this study are intended for use in developing the necessary flood plain management program, including regulatory measures. (Nessa-NC)
W78-00769

FLOOD PLAIN INFORMATION: NORTH NASHUA RIVER, FITCHBURG, , AND LEOMINSTER, MASSACHUSETTS.
Army Engineer District, Waltham, MA.
April 1977, 33 p, 14 fig, 18 plates, 6 tab.

Descriptors: *Massachusetts, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Indirect flood measurement, Maximum probable flood, Flood forecasting, Design flood, Historic floods, Flood frequency, Flood peak, Flow duration, Stage-discharge relations, Flood plains, Standard Project Flood, Flood protection, Flood plain zoning, Flood plain insurance, Building codes, Land use, Planning, Control structures.
Identifiers: *North Nashua River(MA), Fitchburg(MA), Leominster(MA), Intermediate Regional Flood.

The study area includes the portions of Fitchburg and Leominster subject to flooding from the North Nashua River. Flood plain land uses are primarily industrial, with some commercial, residential and agricultural uses. Flood data were obtained from a U.S. Geological Survey (USGS) gage maintained since 1936 at Leominster and newspaper files. The main flood season is spring when snowmelt combines with rainfall, although heavy rains or hurricane activity may cause flooding at any time. The worst flood of record measured at the USGS gage occurred on March 18, 1936, discharging 16,300 cubic feet per second (cfs). At the same location, the 100-year or Intermediate Regional Flood (IRF) is expected to discharge 18,000 cfs, while the Standard Project Flood (SPF) will discharge 24,000 cfs. Twenty-two bridges and 1 culvert offer the principal obstructions to flood flows. The data contained in this report are intended for use in the development of appropriate structural and non-structural flood plain management plans. The study describes various regulatory measures that are available. Regulatory measures include: flood plain zoning, which stipulates the type of development permitted; subdivision ordinances, which control the way in which land is divided for development; building codes that set standards of construction; and health codes. (Nessa-NC)
W78-00770

CONNECTICUT RIVER BASIN SUPPLEMENTAL STUDY, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS AND CONNECTICUT. THE RIVER'S REACH. PHASE I. SOME ENVIRONMENTAL AND FLOOD PLAIN MANAGEMENT IMPLICATIONS OF THE CHANGING ROLE OF AGRICULTURE,
Economic Research Service, Broomall, PA.
R. J. Glass.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 802, Price codes: A02 in paper copy, A01 in microfiche. March 1974, 16 p, 6 tab, 4 fig. CRSS-NERBC1.6C, NERBC1.6C.

Descriptors: *Land use, *Environmental effects, *Agricultural watersheds, *Agriculture, Flooding, Succession, Productivity, Flood protection, Non-structural alternatives.
Identifiers: *Connecticut River Basin, *Flood plain management, *Environmental quality.

This study examines agricultural changes in the Connecticut River Basin, factors responsible for these changes, and the implications of the changes for flood plain management and environmental quality. The interrelated factors affecting the decline of agriculture and loss of agricultural land include changes in technology of agricultural production; interregional competition; competition for human resources; competition for land and other resources; and higher property taxes. Projections indicate a further decline in cropland and pasture acreage in the Basin, but not the level of production or value of some farm commodities, such as mild and eggs. The importance of agriculture for environmental quality and flood plain management is not reflected in its minor role in the Basin's economy. Agricultural lands located in flood plains provide for natural storage which reduce flood peaks in downstream areas, and forested areas have several advantages over agricultural lands. Cropland and pasture interspersed in the predominantly forested Basin improve both its visual quality and productivity for many species of wildlife. When agricultural pursuits are abondoned, farmlands tend to revert to forests. The timing of natural vegetative succession affects many aspects of the environment. Land use controls are capable of shaping a desirable pattern of Basin development. (Nessa-NC)
W78-00774

THOU SHALT NOT FILL PUBLIC WATERS WITHOUT PUBLIC PERMISSION - WASHINGTON'S LAKE CHELAN DECISION,
Washington Univ., Seattle. School of Law.
For primary bibliographic entry see Field 6E.
W78-00788

A BICENTENNIAL REFLECTION: STREAM-GAUGING IN THE UNITED STATES,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7A.
W78-00809

ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS ON NATURAL-FLOW STREAMS IN MASSACHUSETTS,
Geological Survey, Boston, MA. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-00812

WATER RESOURCES OF THE MAUNABO VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
D. G. Adolphson, M. A. Seijo, and T. M. Robison.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 275, Price codes: A03 in paper copy, A01 in microfiche.
Water-Resources Investigations 76-115, May 1977. 38 p, 18 fig, 3 tab, 12 ref.

Descriptors: *Groundwater resources, *Surface waters, *Water quality, *Puerto Rico, Hydrologic data, Aquifer characteristics, Alluvial aquifers, Bedrock, Hydrologic data, Water wells, Pumping, Water yield, Groundwater recharge, Streamflow, Low flow, Floodwater, Water supply, Water demand, Planning, Model studies.
Identifiers: *Maunabo Valley(P R).

The Maunabo Valley, in southestern Puerto Rico, consists of a 3.5-square-mile alluvial plain surrounded by hills of metavolcanic and igneous intrusive rocks. The principal source of ground water in the basin is a shallow unconfined aquifer in the valley alluvium. Continuous pumping of the shallow aquifer has induced the flow of saltwater and has caused the chloride concentration to increase from about 30 to 540 milligrams per liter in the lower part of the valley. A study from January 1971 to December 1974 indicated that the hydraulic conductivities of the aquifer materials, in the basin, are less than 1 foot per day for the metavolcanic and igneous rocks. Estimated conductivities range from 10 to 100 feet per day for the alluvium. The average transmissivity of the alluvial aquifer is estimated to be 4,000 feet squared per day and the average specific capacity is 20 gallons per minute per foot of drawdown. In December 1974, the alluvial aquifer contained an estimated 10,000 acre-feet of water in recoverable storage. The data suggest that water supplies to meet future needs could be supplemented by the construction of surface-water-control structures and additional wells. Analysis of a digital simulation model suggests that wells be located in the upper reaches of the alluvial aquifer where a sustained yield of 3,000 gallons per minute could be obtained. (Woodard-USGS)
W78-00813

PROGRESS REPORT ON STUDY OF MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
W. C. Bridges.
Open-file report 77-478, June 1977. 22 p, 6 fig, 3 tab, 6 ref.

Descriptors: *Flood frequency, *Peak discharge, *Model studies, *Small watersheds, *Florida, Analytical techniques, Rainfall-runoff relationships, Gaging stations, Streamflow, Flow rates, Evaluation.
Identifiers: *Log-Pearson Type III distribution.

Long-term flood records for small basins, especially those basins of less than 10 square miles, are almost nonexistent in Florida. In July 1967 a program was begun to develop a data base to extend short-term flood-peak records for small basins by use of the U.S. Geological Survey rainfall/runoff model. Concurrent rainfall and runoff data, for a 5- to 7-year period, were used to calibrate a model for eight rainfall/runoff gaging stations. The standard error of estimate ranged from 25 to 50 percent. Twenty other rainfall/runoff stations are ready for calibration. The Caney Creek station was calibrated, and the annual peaks simulated for 1902-68 were used as input to develop a flood-frequency curve using a log-Pearson Type III distribution. (Woodard-USGS)
W78-00816

WATER RESOURCES DATA FOR OREGON, WATER YEAR 1975.
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00817

WATER RESOURCES DATA FOR MARYLAND AND DELAWARE, WATER YEAR 1976.
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00818

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1976.
Geological Survey, Bismarck, ND. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00819

PROBABILISTIC SUBSTANTIATION OF LAND IMPROVEMENT REGULATION, (IN RUSSIAN),
Ts. E. Mirtskhulava.
Dokl Vses (Ordena Lenina) Akad S-Kh Nauk Im V I Lenina 3, p 42-44, 1975.

Descriptors: *Model studies, Stochastic processes, Groundwater, *Regulation, Probability, *Drainage, Forecasting, *Land reclamation.

A stochastic model was developed which provides the necessary decrease of groundwaters with a given reliability which ensures reliability of draining with a certain probability. A relation is given for correcting design dependences for predicting the distance between drains and a number of other parameters with consideration of the random character of the factors governing the drainage process.--Copyright 1976, Biological Abstracts, Inc.
W78-00851

4B. Groundwater Management

NORTHERN KALAHARI GROUNDWATERS: HYDROLOGIC, ISOTOPIC AND CHEMICAL STUDIES AT ORAPA, BOTSWANA,
University of the Witwatersrand, Johannesburg (South Africa). Nuclear Physics Research Unit.
For primary bibliographic entry see Field 2F.
W78-00521

ANALYTIC SOLUTION FOR DRAWDOWN IN AN UNCONFINED-CONFINED RECTANGULAR AQUIFER,
Birmingham Univ. (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2F.
W78-00522

OBSERVATION WELL RESPONSE TIME AND ITS EFFECT UPON AQUIFER TEST RESULTS,
Institute of Geological Sciences, London (England).
J. H. Black, and K. L. Kipp, Jr.
Journal of Hydrology, Vol. 34, No. 3/4, p 297-306, August 1977. 3 fig, 2 tab, 5 ref.

Descriptors: *Observation wells, *Time lag, *Aquifer testing, *Pumping, Aquifer characteristics, Equations, Mathematical studies, Curves, Graphical analysis, Theis equation, Water levels, Water wells, Transmissivity, Storage coefficient, Drawdown, Hydraulic conductivity.
Identifiers: *Slug tests, *Type curves, Hydrostatic time lag.

The concept of observation-well response time was introduced in the context of aquifer pump tests. Previous work on hydrostatic time lag and slug tests was considered together with the precise way in which an observation well responds during an aquifer test. Using the concepts of Hvorslev, an equation was produced linking observation-well response time, a, and a dimensionless response-time factor beta. The Theis equation was modified by various values of beta to derive a set of type curves. The 2 parameters a and beta were related by a simple equation involving aquifer transmissivity. T, and storativity, S. Both a and beta can be obtained from an aquifer test, while a alone can be obtained independently from a slug test. An example was given showing the effect of beta upon aquifer test results, and the value of a calculated from the aquifer test analysis was corroborated by slug test results. The definition of beta was used to show in what circumstances it will be important and how its effect can be reduced to a minimum. The introduction of slug testing of observation wells as standard practice for all aquifer tests was suggested. (Visocky-ISWS)
W78-00523

PENNSYLVANIA WATER RESOURCES RESEARCH CENTER TECHNOLOGY TRANSFER PROGRAMS - A CASE STUDY,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sharpe.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 841, Price codes: A02 in paper copy, A01 in microfiche.
Institute for Research on Land and Water Resources, University Park, Completion Report, September, 1977. 18 p, 3 tab. OWRT A-047-PA(1). 14-34-0001-6039.

Descriptors: *Pennsylvania, Fractures(Geologic), Water resources institute, Costs, Water supply, Technology, Water wells, Sites, Bedrock, Evaluation, Water resources development.
Identifiers: *Economic benefits, *Water development costs, *Fracture trace water well location, *Technology transfer, Industry location.

Water Resources Research Institutes or Centers do not often make dollar assessments of the benefits of their programs. Admittedly, such evaluations are to a degree self-servicing and require less than the normal modesty possessed by most such organizations. Without an active technology transfer program, estimates of accomplishment are likely to appear somewhat less than favorable, although individual researchers acting alone can account for significant results in technology transfer. This evaluation of the Penn State Water Center's technology transfer program indicates that it has been successful. The application of the fracture trace water well location method developed by Water Center researchers is an excellent example of technology transfer. A tremendous savings in water development costs has accrued to users of this technology. In addition, significant economic benefits have accrued to the Commonwealth of Pennsylvania from the location of new industry in areas where an adequate water supply was assured using this water well location technique. Estimated savings in water development costs for Pennsylvania alone in excess of $32,000,000. As more Pennsylvania communities employ this technique, the savings should greatly exceed this figure. (See also W75-08388, W74-03141; W74-01691; W72-10439; W72-02115; and W71-00201) (Sink-Penn State)
W78-00565

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: APPLICATION OF LINEAR SYSTEMS ANALYSIS TO GROUND WATER EVALUATION STUDIES,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 2F.
W78-00570

AN ARCHETYPAL LINEAR PROGRAMMING MODEL FOR OPTIMAL INTERTEMPORAL ALLOCATION OF GROUNDWATER TO AGRICULTURAL ACTIVITIES,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
R. N. Weisz, and C. L. Towle, Jr.
Water Resources Bulletin, Vol. 13, No. 5, p 1035-1046, October 1977. 3 fig, 2 tab, 20 ref.

Descriptors: *Groundwater, *Water allocation(Policy), *Linear programming, *Economic efficiency, *Planning, Simulation analysis, Constraints, Aquifers, Discount rates, Equations, Mathematical models, Systems analysis, Optimization, Water utilization, Water supply.
Identifiers: *Agricultural use, *Benefit maximization.

In the past, researchers have applied a variety of analytical techniques for maximizing the present value of a stock resource: simulation, calculus of variations, stochastic dynamic programming, and optimal control theory. Presented herein is a more operational approach--linear programming. A simplified, broadly drawn example from Southwest agriculture is used for demonstrating the model structure and output; the method is based on a set of state transformation operations that prevent the additivity assumption of linear programming from being violated. The test case concerns a geologically isolated aquifer wholely managed by one entity (i.e., the farmer) who must maximize benefits over a two-year planning period. A comparison is made of the simulation run with that of optimization. The archetypal linear programming model for maximizing the present value of net benefits from a groundwater stock resource is proven over a range of realistic parameter values. It should find innumerable applications in the economic analysis of Southwest agricultural problems in areas where basin-wide management of a groundwater resource is appropriate. (Bell-Cornell)
W78-00629

SOME WATER RESOURCE SYSTEM STUDIES IN THE UK,
Department of the Environment, Reading (England). Central Water Planning Unit.
A. B. Birtles, and D. A. Nutbrown.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, p 28-35, 1975. 1 fig, 4 ref.

Descriptors: *Water resources, *Systems analysis, *Mathematical models, *River regulation, *Conjuctive use, *Groundwater, *Surface waters, *Aquifers, Artificial recharge, Saline water intrusion, Fissures(Geologic), Optimization, Design, Operations, Computer models, Water supply, Pumping, Equations.
Identifiers: Intergranular flow, South Downs(United Kingdom), Vale of York(England).

Various case studies which utilize systems analysis for solving water resource system problems are presented. Aspects of these studies include problems associated with artificial recharge, the combined use of ground and surface waters, and saline intrusion. Particular emphasis is placed on the interaction of the ground and surface water components. Aquifers typified by both fissure and intergranular flow are involved in the studies. Described is the use of modeling techniques in the optimization of the design and operation of such systems. Considered is a digital model constructed to describe the transient effects of natural infiltration and abstraction on the movement of groundwater, to be used as a tool to assist with the long-term management of the Chalk aquifer of the South Downs, United Kingdom, the primary aim being to estimate the maximum yield of the aquifer. Described next is a digital groundwater model used in the design of a river regulation scheme in which groundwater abstracted from the Triassic sandstones aquifer in the Vale of York, England, is used in combination with the Yorkshire Ouse to provide a safe regulated yield. (See also W77-10419) (Bell-Cornell)
W78-00636

THE ROLE OF STATE LEGISLATION IN GROUND WATER MANAGEMENT,
Arizona Univ., Tucson. School of Law.
R. E. Clark.
Creighton Law Review, Vol 10, No 3, p 469-87, March 1977.

Descriptors: *Groundwater, *Legislation, *Prior appropriation, *State governments, *Administration, National Water Commission, Water rights, Permits, Planning, Regulation, Arizona, New Mexico, Administrative agencies, Well regulations, Conjunctive use, Water sources, Oklahoma, Southwest US.
Identifiers: *Groundwater management, Administrative regulations.

Legal control on the use of natural resources is usually a last resort to prevent catastrophe rather than part of a cohesive program. Determination of water rights is dependent largely on state law with some federal input resulting from federal installation and water quality standards. However, states should not overlook interstate and national problems causally linked with local ground water problems. The water law doctrines of the Western states are examined. These doctrines include absolute ownership allowing unlimited withdrawals, correlative rights which provide for modified allocation, and reasonable use which is similar to correlative rights. An affective ground water management plan must include recognition that: (1) water is unlike minerals in place; (2) surface and ground waters must be conjunctively managed; (3) well-licensing must consider aquifer depletion; (4) all wills must be registered; (5) there must be a permit system to protect existing uses; (6) the permit system must be flexible; (7) water quality requirements must be included in legislation; (8) an independent administrative authority must carry out the policy; (9) the policy making authority must be a broad constituency; and (10) control areas cannot be dominated by large users. Future legislation should recognize the interrelationships between resources. (Molloy-Florida)
W78-00658

CONGRESS RECEIVES COMPREHENSIVE GROUND WATER REPORT.
Water Well Journal, p. 42-43, August, 1977.

Descriptors: *Aquifers, *Aquifer systems, *Groundwater, *Aquifer management, Water conservation, Hydrologic data, Water resources development, Water supply, Water management(Applied), Water quality, Water sources, Water storage, Management, Groundwater recharge, Saline water intrusion, Sedimentation, Subsurface waters, Surface waters, Conjunctive use, Surface-groundwater relationship, Groundwater resources.
Identifiers: *Groundwater management, Administrative regulations.

A report on ground water, titled 'Ground Water--An Overview', prepared by the National Water Well Association, was presented to the President and Congress on June 21, 1977. The report stressed the importance of ground water supplies and the many problems facing the nation. In many instances ground water from aquifers is being used faster than it is being replenished. Soil subsidence and saltwater seepage into fresh ground water reservoirs are also occurring. Management of ground water resources has rested with state and local governments with the federal government acting as a technical advisor. However, ground water management has generally occurred only after a locality had been faced with supply problems. Optimal water management would include using and managing surface and ground water as a unit and planning the use of nontributary ground waters. However, a more comprehensive management program would require more data on the aquifer system and the quality and quantity of the water supply. In addition, policy questions must be answered concerning the extent of Federal participation in ground water management. (Kastner-Florida)
W78-00662

WESTWIDE STUDY (CRITICAL WATER PROBLEMS FACING THE ELEVEN WESTERN STATES).
Bureau of Reclamation, Washington, DC.
For primary bibliographic entry see Field 4A.
W78-00663

WATER AND LAND DEVELOPMENT--WELLS.
For primary bibliographic entry see Field 6E.
W78-00672

THE VELUWE ARTIFICIAL RECHARGE PLAN WATER QUALITY ASPECTS,
Rijksinstituut voor Drinkwatervoorziening, The Hague (Netherlands).
For primary bibliographic entry see Field 5G.
W78-00690

MATHEMATICAL MODEL OF ULUOVA PLAIN, TURKEY - A TRAINING AND MANAGEMENT TOOL,
Belgrad Univ. (Yugoslavia).
For primary bibliographic entry see Field 2A.
W78-00692

TRANSIENT SPHERICAL FLOW TO A CAVITY WELL OF FINITE DIAMETER,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W78-00693

POLYCYCLIC AROMATICS IN SURFACE AND GROUND WATER,
For primary bibliographic entry see Field 5A.
W78-00702

REVIEW OF C.E. JACOB'S DOUBLET WELL,
For primary bibliographic entry see Field 8B.
W78-00720

MAPS SHOWING GROUND-WATER CONDITIONS IN THE NORTHERN PART OF THE CHINLE AREA, APACHE COUNTY, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00802

MAPS SHOWING GROUND-WATER CONDITIONS IN THE MONUMENT VALLEY AND NORTHERN PART OF THE BLACK MESA AREAS, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00803

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SOUTHERN PART OF THE BLACK MESA AREA, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.

For primary bibliographic entry see Field 7C.
W78-00804

JARRETTSVILLE QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00805

BEL AIR QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00806

GROUND-WATER INVESTIGATION AT THE ALLUVIAL FAN OF THE SOUTH FORK EAGLE RIVER, ANCHORAGE, ALASKA - RESULTS OF TEST DRILLING, 1976,
Geological Survey, Anchorage, AL. Water Resources Div.
L. L. Dearborn.
Open-file report 77-493, 1977. 9 p, 2 fig, 1 plate, 1 tab, 5 ref.

Descriptors: *Test wells, *Drilling, *Artesian aquifers, *Water yield, *Alaska, Hydrogeology, Drillers logs, Pumping, Drawdown, Water levels, Groundwater recharge, Water quality.
Identifiers: *Anchorage area(Alaska), *Eagle River Valley.

In late 1976, at Anchorage, Alaska, a ground-water exploration well was drilled to a depth of 487 feet on the South Fork Eagle River fan near the confluence with the mainstream. The well penetrated four sand and gravel strata of low water-yielding capacity and extended 37 ft into metamorphic bedrock. Earth water-bearing stratum was pumped for several hours, and the best aquifer yield was found to be 1.7 gal/min/ft of drawdown. These test results support the conclusion, previously inferred from drilling data at a nearby test hole drilled in 1973, that there are no confined aquifers of large yield in the subsurface at this locality. (Woodard-USGS)
W78-00810

GROUND-WATER RESOURCES OF THE ALLUVIAL AQUIFERS IN NORTHEASTERN LARIMER COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
R. T. Hurr, and P. A. Schneider, Jr.
Water-Resources Investigations 77-7 (open-file report), January 1977. 31 p, 5 fig, 6 plates, 7 tab, 13 ref.

Descriptors: *Groundwater resources, *Alluvial aquifers, *Water wells, *Water yield, *Water quality, *Colorado, Water users, Water supply, Municipal water, Domestic water, Irrigation water, Stock water, Groundwater recharge, Groundwater movement, Chemical analysis, Maps, Geology, Water table, Path of pollutants, Hydrographs.
Identifiers: Northeastern Larimer County(Colo), *Selenium.

Ground water is a source of municipal, domestic, stock, and irrigation supply for most of northeastern Larimer County, Colo. A study of the alluvial aquifers in the northeastern part of the county was conducted to determine volume of water in storage, rate and location of ground-water withdrawals, and chemical quality of the water with particular attention to dissolved solids, hardness, sulfate, and selenium. There are 251 large-capacity wells in the study area. Well yields range from about 80 gpm (gallons per minute) to a little over 1,800 gpm. Total volume of water in storage is about 133,000 acre-feet--32,000 acre-feet in the alluvium of Buckeye terrace and 101,000 acre-feet in the valley-fill aquifer associated with Boxelder Creek. Ground-water withdrawals for irrigation are about 25,000 acre-feet annually. The municipal wells pumped 210 acre-feet in 1974. The factors affecting ground-water quality are the quality of applied irrigation water, the amount of water lost to evapotranspiration during irrigation, and, to a lesser degree, solution of soluble material in the alluvium and in the bedrock at the base of the alluvium. Ground water at the north end of the Buckeye terrace contains only about 300 mg/liter dissolved solids. Recharge is from surface water containing less than 90 mg/liter dissolved solids. Concentrations of all constituents increase downgradient to the south due to solution and evaporative concentration. (Woodard-USGS)
W78-00811

WATER RESOURCES OF THE MAUNABO VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00813

DISTRIBUTION OF INJECTED WASTEWATER IN THE SALINE LAVA AQUIFER, WAILUKU-KAHULUI WASTEWATER TREATMENT FACILITY, KAHULUI, MAUI, HAWAII,
Geological Survey, Menlo Park, CA. Water Resources Div.; Geological Survey, Reston VA.; and Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00814

CHEMICAL, ISOTOPIC, AND GAS COMPOSITIONS OF SELECTED THERMAL SPRINGS IN ARIZONA, NEW MEXICO, AND UTAH,
Geological Survey, Menlo Park, CA. Water Resources Div.
R. H. Mariner, T. S. Presser, and W. C. Evans.
Open-file report 77-654, August 1977. 42 p, 4 fig, 8 tab, 40 ref.

Descriptors: *Geothermal studies, *Thermal springs, *Water chemistry, *Arizona, *New Mexico, *Utah, Thermal water, Water temperature, Chemical reactions, Chemical properties, Gases, Deuterium, Hydrogen ion concentration, Oxygen isotopes.
Identifiers: Geothermometers.

Twenty-seven thermal springs in Arizona, New Mexico, and Utah were sampled for detailed chemical and isotopic analysis. The springs issue sodium chloride, sodium bicarbonate, or sodium mixed-anion waters of near neutral (6.2) to alkaline (9.2) pH. High concentrations of fluoride, more than 8 milligrams per liter, occur in Arizona in waters from Gillard Hot Springs, Castle Hot Springs, and the unnamed spring of Eagle Creek, and in New Mexico from springs along the Gila River. Deuterium compositions of the thermal waters cover the same range as those expected for meteoric waters in the respective areas. The chemical compositions of the thermal waters indicate that Thermo Hot Springs in Utah and Gillard Hot Springs in Arizona represent hydrothermal systems which are at temperatures higher than 125 deg C. Estimates of subsurface temperature based on the quartz and Na-K-Ca geothermometer differ by up to 60 deg C for Monroe, Joseph, Red Hill, and Crater hot springs in Utah. Similar conflicting estimates of aquifer temperature occur for Verde Hot Springs, the springs near Clifton and Coolidge Dam, in Arizona; and the warm springs near San Ysidro, Radium Hot Springs, and San Francisco Hot Springs, in New Mexico. Such disparities could result from mixing, precipitation of calcium carbonate, or perhaps appreciable concentrations of magnesium. (Woodard-USGS)
W78-00815

WATER RESOURCES DATA FOR OREGON, WATER YEAR 1975.
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00817

WATER RESOURCES DATA FOR MARYLAND AND DELAWARE, WATER YEAR 1976.
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00818

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1976.
Geological Survey, Bismarck, ND. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00819

ARTIFICIAL-RECHARGE TESTS IN UPPER BLACK SQUIRREL CREEK BASIN, JIMMY CAMP VALLEY, AND FOUNTAIN VALLEY, EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
P. J. Emmons.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 330, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-11, July 1977. 49 p, 17 fig, 8 tab, 52 ref.

Descriptors: *Artificial recharge, *Alluvial aquifers, *Recharge ponds, *Water spreading, *Water table, Water level fluctuations, Groundwater movement, Colorado.
Identifiers: El Paso County(Colo), Black Squirrel Creek, Jimmy Camp Creek, Fountain Creek.

Artificial-recharge tests were conducted in the alluvium in upper Black Squirrel Creek basin, the alluvium in Jimmy Camp Valley, and in the alluvium overlying the Widefield aquifer which is located in an ancestral channel in Fountain Valley, Colo. Nine artificial-recharge pits with areas of approximately 9,200 square feet each were excavated in the unsaturated zones above the three aquifers. Each artificial-recharge site was instrumented to measure inflow, stage fluctuations, and water-table fluctuations. Artificial-recharge tests of approximately 10 days' duration were conducted at each of the nine artificial-recharge sites and one extended test of approximately 30 days' duration was conducted in each of the three study areas. Periphyton growth, present in most of the artificial-recharge ponds, was insufficient to cause noticeable decline in the rate of infiltration. (Woodard-USGS)
W78-00821

GROUND WATER IN THE LAJAS VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
H. R. Anderson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 360, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 76-68, March 1977. 45 p, 16 fig, 4 tab, 28 ref.

Descriptors: *Groundwater resources, *Water quality, *Irrigation, *Saturated soils, *Puerto Rico, Evapotranspiration, Salinity, Aquifer characteristics, Water wells, Water yield, Alluvium, Limestones, Water level fluctuations, Model studies.
Identifiers: *Lajas Valley(PR).

Lajas Valley, an agricultural district in southwestern Puerto Rico, is plagued with salinity and waterlogging problems of the soils. Use of

brackish ground water, averaging 500 mg/liter dissolved solids, for irrigation compounded the problem until a surface-water irrigation-drainage system was constructed in 1955. Wells tapping the buried limestone aquifer in the northwest part of the valley will yield as much as 2,000 gallons per minute of brackish water. At peak development in the 1940's, 18 wells in the valley pumped about 23 mgd for irrigation. The average specific capacity of the wells for an 8-hour period was about 30 gallons per minute per foot of drawdown. Transmissivity of the limestone aquifer is about 4,000-5,000 square feet per day. Permeability is from solution holes and solution-enlarged fractures. Recharge to the limestone is principally by infiltration of rainfall and streamflow on the outcrop area of the limestone and the hydraulically connected alluvial fans on the northern side of the valley. Groundwater flow in the limestone aquifer is westward toward Bahia de Boqueron. Rainfall in the valley averages about 34 inches annually, decreasing toward the south coast. Pan evaporation of 76 inches a year gives an evapotranspiration potential of about 50 inches. Results from a digital-model analysis of the valley show that a network of discharge wells could alleviate waterlogging in the eastern artesian area. The upward hydraulic gradients would be reduced by pumping, thereby easing drainage requirements. (Woodard-USGS)
W78-00822

4C. Effects On Water Of Man's Non-Water Activities

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VII - AN INVESTIGATION OF THE VERTICAL AND HORIZONTAL HYDRAULIC CONDUCTIVITIES OF DENSE BASE COURSE AGGREGATES,
Maryland Univ., College Park. Dept. of Civil Engineering.
T. J. Moynahan, and Y. M. Sternberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 457, Price codes: A11 in paper copy, A01 in microfiche. Report AW074-073-046-7, July 1974. 239 p, 121 fig, 29 tab, 20 ref, 11 append. DOT AW074-073-046.

Descriptors: *Hydraulic conductivity, *Highways, *Drainage, *Laboratory tests, Permeability, Soils, Soil properties, Soil physical properties, Permeameters, Equipment, Soil water movement, Subsurface drainage, Darcys law, Mathematical models, Data processing, Civil engineering.
Identifiers: *Highway design, *Highway drainage.

The report described an experimental investigation designed to examine the effects on permeability of a dense graded base course aggregate when the gradation is varied within the allowable range set forth by the Maryland State Highway Administration. The graduations were chosen so that the amount of fines by weight passing the number 200 sieve was varied between 10 and 0%. The study showed that significant increases in hydraulic conductivity can be realized by shifting the gradation curve from the finest curve to the coarsest curve within the MSHA allowable range for material designated dense graded aggregate. The study also presented a device which measures both vertical and horizontal hydraulic conductivity of the same granular base course specimen. Practical application of horizontal hydraulic conductivity was discussed in reference to the Corps of Engineers' drainage requirement for base course materials. (Sims-ISWS)
W78-00544

EVALUATION OF STREAMSIDE BUFFERSTRIPS FOR PROTECTING AQUATIC ORGANISMS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
D. Erman, J. D. Newbold, and K. B. Roby.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 605, Price codes: A04 in paper copy, A01 in microfiche. Contribution No. 165, California Water Resources Center, Davis, September 1977. 48 p, 54 ref, 3 append. (California Water Resources Center Project UCAL-WRC-W-411), OWRT-A-047-CAL(3).

Descriptors: *Aquatic microorganisms, *Benthos, *Invertebrates, Biological communities, Evaluation, *California, Streams, *Lumbering, Ecological distribution.
Identifiers: *Bufferstrips(Streams).

Sixty-two northern California streams were studied to evaluate the impact of invertebrate communities of logging with and without streamside bufferstrips. Benthic invertebrate communities of disturbed and undisturbed streams were compared by diversity index and ecological distance. Benthic invertebrate communities from streams logged without protective measures were significantly different from communities of unlogged (control) streams based on both diversity and ecological distance. Logging impacts were detected also in streams with buffer widths of less than approximately 30 meters. Streams with bufferstrips wider than 30 meters did not display logging impacts. There was a direct correlation between increases in an index of diversity and increases in buffer width, and hence probably the degree of stream protection increased with buffer widths up to 30 meters. Invertebrate communities of logged or distrubed streams had a lower diversity index and higher populations than of unlogged streams. Communities in localized disturbances were significantly different from control stream sections. The differences were qualitative (i.e., different taxa) and thus contrast with the differences noted in logged or narrow buffered streams. (Snyder-California, Davis)
W78-00553

SOME EFFECTS OF DUSTFALL ON URBAN STORMWATER QUALITY,
Enviro-Measure, Inc., Knoxville, TN.
For primary bibliographic entry see Field 5A.
W78-00697

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS,
Water Resources Engineers, Springfield, VA.
For primary bibliographic entry see Field 8B.
W78-00699

QUANTITY AND QUALITY OF URBAN STORM WATER IN SOUTHEAST FLORIDA,
Geological Survey, Miami, FL. Water Resources Div.
For primary bibliographic entry see Field 3D.
W78-00824

4D. Watershed Protection

A COMPARISON OF INTERORGANIZATIONAL RELATIONSHIPS WITHIN TWO CONTIGUOUS WATERSHED DISTRICTS,
Mississippi State Univ., Mississippi State. Dept. of Sociology.
For primary bibliographic entry see Field 6E.
W78-00559

A WATERSHED PLANNING AND MANAGEMENT SYSTEM: DESIGN AND SYNTHESIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Div. of Environmental and Urban Systems; and Virginia Polytechnic Inst. and State Univ., Blackburg. School of Forestry and Wildlife Resources.
R. H. Giles, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 761, Price codes: A07 in paper copy, A01 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 102, September 1977. 133 p, 7 tab, 12 fig, 124 ref. OWRT A-064-VA(1).

Descriptors: *Planning, *Watershed management, *Optimization, Decision making, Ecosystems, Virginia, Design criteria, *Land use, Computer programs, Attitudes.
Identifiers: *South River Watershed(Va), *Urban watersheds.

This research develops a blueprint for a watershed management system, conceived for the South River Watershed in Virginia, that could be used in making decisions about the future development of any similar large urbanizing watershed. The investigation analyzes the problem of land-use planning and management, particularly the need for a system providing long-term rational management and allowing achievement of complex human goals and objectives. Twenty-two tenets of land-use management are cited as fundamental to the design and implementation of such a system, and major phenomena that have obscured or halted comprehensive management efforts in the past are analyzed. One part of this report discusses the 'taking issue' and how it relates to the proposed system. Existing institutions that influence land use are also analyzed. A 'watershed guidance center' is proposed. The study then describes an objective function that can be used as the basis for decisionmaking concerning a watershed. This expression is based on over 300 citizen-weighted objectives, each having a production function. Each production is expressed in net energy, for the total management system is energy-based and is related to probable change in physical and ecological systems. A computer program is described which would integrate citizens' expressions of preferred management goals. A modified form of goal programming is proposed as the solution algorithm. Many of the inputs necessary for operation of the total management system already are available in the 'State Information System,' also described in this report.
W78-00560

HYDROLOGIC MODELING OF THE DEVILS LAKE BASIN WATERSHEDS,
North Dakota Water Resources Research Inst., Fargo.
B. M. Parekh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 815, Price codes: A07 in paper copy, A01 in microfiche. Completion Report No WI-221-042-77, October 1976. 138 p, 30 fig, 23 tab, 13 ref. The Devils Lake Basin Study, Volume IV. Continuing Studies. OWRT A-048-NDAK(1). 14-34-0001-7072.

Descriptors: *Model studies, Watershed management, *Watersheds(Basins), Hydrologic aspects, *North Dakota, Simulation analysis, Lake basins, *Soil moisture, Hydrologic data, Planning, Data collections.
Identifiers: *Devils Lake Basin(N Dak).

Outlined is the progress made in developing a comprehensive hydrologic simulation model of the Devils Lake Basin (DLB) and its constituent watersheds. The simulation model being developed for the DLB is an explicit soil moisture accounting (ESMA) model that generates outputs on streamflow discharge and stage for any desired location of the basin channel network. For instance, in addition to assessing the hydrologic impact of proposed changes it can be programmed to provide reliable flood forecasts; it will also be capable of devising operational procedures of control structures to optimize the stability of the surface waters of the Devils Lake Basin. As a result such a model would be an effective tool in addressing the decision-making needs of planning and management. Accomplishments include the

completion of a comprehensive inventory and assessment of the existing hydrometeorologic data for a 25 year historic record period (1948-1972). Available information on the topographic and physiographic characteristics of the basin watersheds has been developed which has permitted a systematic consolidation of otherwise uncorrelated basin-wide data. Preliminary trials to simulate the hydrologic response of the entire basin land surface have been performed. Two major tasks remain: (1) Model calibration on the Big Coulee gage and on the lake level gages, especially on Devils Lake; and (2) Completion of long-term simulations to meet the planning requirements of the DLB study.
W78-00569

MULTIPURPOSE USE OF CATCHMENT MODELS FOR OPERATIONAL FORECASTING AND PLANNING STUDIES,
Institut fuer Wasserwirtschaft, Berlin (East Germany).
For primary bibliographic entry see Field 2A.
W78-00635

HIERARCHICAL MULTIPLE OBJECTIVE ANALYSIS OF LAND AND WATER RESOURCE UTILIZATION FOR A SYSTEM OF LAKES,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 4A.
W78-00646

SEDIMENT TRANSPORT FROM A RURAL CATCHMENT IN NEW SOUTH WALES,
Newcastle Univ. (Australia). Dept. of Geography.
For primary bibliographic entry see Field 2J.
W78-00680

QUALITY OF WATER DISCHARGED FROM THREE SMALL AGRONOMIC WATERSHEDS IN THE MAUMEE RIVER BASIN,
Ohio Agricultural Research and Development Center, Wooster. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-00688

SOLUBLE AND SEDIMENT NITROGEN LOSSES AS RELATED TO LAND USE AND TYPE OF SOIL IN EASTERN CANADA,
Macdonald Coll., Ste Anne de Bellevue (Quebec). Dept. of Renewable Resources.
For primary bibliographic entry see Field 5B.
W78-00689

NEW ENGLAND RIVER BASINS COMMISSION FINDINGS AND RECOMMENDATIONS ON THE CONNECTICUT RIVER BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION.
New England River Basins Commission, Boston, MA.
For primary bibliographic entry see Field 6B.
W78-00746

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

REACTIONS OF ORGANOMERCURY (I) COMPOUNDS WITH LIGANDS CONTAINED IN NATURAL WATER SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Chemistry.
D. E. Tallman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 633, Price codes: A02 in paper copy, A01 in microfiche. North Dakota Water Resources Research Institute, Fargo, Completion Report No. WI-222-013-76, September 1977. 11 p, 2 fig, 10 ref. OWRT B-019-NDAK(1), 14-31-0001-3628.

Descriptors: *Mercury, *Chemical reactions, *Kinetics, Measurement, Ions, Chlorides, Electrolytes, Hydrogen ion concentration, Electrochemistry, Water analysis, Analytical techniques, Pollutant identification.
Identifiers: *Organomercury, *Chemical relaxation kinetics, *Methylmercury compounds, Ligands.

Chemical relaxation measurements have been carried out on solutions containing organomercury (I) (10 to the -3 power to 10 to the -5 power M), chloride ion (10 to the -4 power to 10 to the -2 power M) and inert electrolyte (0.15 M KNO3) throughout the pH range 7.0 to 9.5. The primary relaxation process is attributed to a ligand exchange reaction resulting in the formation of the organomercury chloride complex from the corresponding hydroxide complex. The concentration and pH dependence of the relaxation times suggests that a rather complex mechanism involving parallel reaction pathways may be operative in these systems. Small but discernible differences in the kinetic parameters for the methyl-, ethyl- and phenylmercury systems have been observed. The rate of replacement of OH- by Cl- decreases in the order Ch3->C2H5>C6H5-. These small differences are probably due to slight variations in the inductive effect of the organo substituent across the Hg.
W78-00502

WASTES FROM SMALL POULTRY DRESSING ESTABLISHMENTS,
Center for Disease Control, Atlanta, GA.
H. W. Wolf, and W. T. Woodring.
Sewage and Industrial Wastes, Vol. 25, No. 12, P 1429-1431, December, 1953. 4 tab, 3 ref.

Descriptors: *Food processing industry, *Poultry, *Water analysis, *Water utilization, Biochemical oxygen demand, Cost analysis, Waste identification.
Identifiers: *Poultry processing wastes.

The environmental sanitation training school of the Department of Public Health, Columbus, Georgia, conducted a survey of two poultry dressing establishments in central Georgia. Presented is an account of the water use and waste strength findings resulting from the survey. Descriptions of operation for both plants are given. Recommendations for reduction in strength and volume of liquid wastes are given. Profit by the sale of blood is discussed. (Prodehl-EPA, Corvallis)
W78-00510

RENDERING PLANT WASTE TREATMENT STUDIES,
North Carolina Univ. at Chapel Hill. School of Public Health.
M. L. Granstrom.
Sewage and Industrial Wastes, Vol. 23, No. 8, p 1012-1016, August 1951, 3 fig. Presented at 1950 Annual Meeting, North Carolina Sewage and Industrial Wastes, Assn; Durham, North Carolina; Nov 13-15, 1950.

Descriptors: *Chemical analysis, *Coagulation, *Waste water treatment, *Food processing industry, Chemical precipitation, Flocculation, Biochemical oxygen demand, Chlorine, Effects, Oil wastes.
Identifiers: *Rendering wastes, *Chemical coagulation, Grease, Color reduction.

The source of strong liquid wastes is the washing of tanks, barrels, and floors; the wastes become black, smelly, and septic due to partial decomposition from the time lag between slaughter and rendering process. This organic matter, in mostly a dissolved state, was studied. Chemical coagulation was the most economical waste treatment process for the typical rendering plant removed from a public sewer system. A rendering plant near Chapel Hill, N. C. was selected for study, where quantity of waste water is about 1,000 gallon per ton of animal food produced. Filter alum and chlorine were added to the clarifier. Each chemical performs two functions: the alum reacts to form floc and reduce the pH, the chlorine oxidizes the reduced material and coagulates the protein. A custom designed pipe guide system was used to distribute the chemicals. Laboratory investigations were made on the effect of varying alum and chlorine doses. Results included: reduction in BOD from 1500 - 3,800 ppm to 400 - 600 ppm; reduction in color; and improved clarification. (Prodehl-EPA, Corvallis)
W78-00513

NORTHERN KALAHARI GROUNDWATERS: HYDROLOGIC, ISOTOPIC AND CHEMICAL STUDIES AT ORAPA, BOTSWANA,
University of the Witwatersrand, Johannesburg (South Africa). Nuclear Physics Research Unit.
For primary bibliographic entry see Field 2F.
W78-00521

EFFECTS OF SLUDGE APPLICATIONS ON SOIL WATER AND VEGETATION IN A NORTHERN HARDWOOD FOREST IN NEW ENGLAND,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W78-00567

HYDROLOGIC AND BIOLOGIC CHARACTERISTICS OF NATURAL CHANNELS IN COASTAL MARSH OF MISSISSIPPI,
University of Southern Mississippi, Hattiesburg. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-00568

COMPARATIVE OIL TOXICITY AND COMPARATIVE ANIMAL SENSITIVITY,
National Marine Fisheries Service, Auke Bay, AL. Auke Bay Fisheries Lab.
S. D. Rice, J. W. Short, and J. F. Karinen.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 78-94, 1977. 1 fig, 3 tab, 48 ref.

Descriptors: *Toxicity, *Growth stages, *Oil spills, *Oil pollution, *Aromatic compounds, *Bioassay, *Water analysis, *Solubility, *Mortality, *Animal metabolism, Oil-water interfaces, *Dispersion, *Larvae, Organic compounds, Water pollution effects, Methodology, Reviews.
Identifiers: *Crude oil.

This review covered studies dealing with the ability of crude and refined oils to kill marine animals. Literature was summarized on the subjects of : (1) the behavior of oil in water; (2) the methodology problems associated with bioassay; (3) the comparative toxicity of oil water mixtures, oils and components of oils; and (4) the comparative sensitivity of different life stages and species. (See also W78-00572) (Katz)
W78-00580

RESPONSES TO SUBLETHAL LEVELS OF PETROLEUM HYDROCARBONS: ARE THEY SENSITIVE INDICATORS AND DO THEY CORRELATE WITH TISSUE CONCENTRATION,
Battelle Pacific Northwest Labs., Sequim, WA. Marine Research Lab.
J. W. Anderson.

In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 95-114, 1977. 12 fig, 2 tab, 68 ref.

Descriptors: *Oil, *Oil pollution, *Toxicity, *Mortality, *Bioindicators, *Salinity, Animal physiology, *Growth stages, *Shrimp, *Respiration, Animal behavior, *Reproduction, Organic compounds, Chemical analysis, Analytical techniques, Laboratory tests, Lethal limit, Reviews.
Identifiers: Bioaccumulation, Tissue analysis, *Sublethal effects, *Naphthalene.

A review of recent literature on the sublethal effects of various hydrocarbon pollutants was presented. Numerous technical problems encountered in laboratory analyses were addressed. Considerable emphasis was placed on the difficulty of inter-study comparisons due to varying experimental designs. (See also W78-00572) (Katz)
W78-00581

THE EFFECTS OF PETROLEUM HYDROCARBON EXPOSURE ON THE STRUCTURE OF FISH TISSUES,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
J. W. Hawkes.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 115-128, 1977. 15 fig, 1 tab, 36 ref.

Descriptors: *Oil, *Oil pollution, *Electron microscopy, Animal physiology, Animal behavior, *Animal metabolism, *Cytological studies, Animal pathology, *Toxicity, Fish physiology, Organic compounds, Analytical techniques, Path of pollutants, Lethal limit, Reviews.
Identifiers: *Crude oil, Tissue analysis, Teratogens, Gills, Sublethal effects, Histology.

Literature on the sublethal effects of petroleum hydrocarbons at cellular and subcellular levels in fish was reviewed. New data presented dealt with the effects of crude oil on several species of fish. The electron microscope was used extensively to demonstrate alterations in tissue structure due to the exposure to the water soluble fraction of crude oil. (See also W78-00572) (Katz)
W78-00582

THERMAL CONDUCTANCE OF IMMERSED PINNIPED AND SEA OTTER PELTS BEFORE AND AFTER OILING WITH PRUDHOE BAY CRUDE,
Scripps Institution of Oceanography, La Jolla, CA. Physiological Research Lab.
G. L. Kooyman, R. W. Davis, and M. A. Castellini.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 151-157, 1977. 1 fig, 3 tab, 13 ref.

Descriptors: *Thermal conductivity, *Thermal insulation, *Heat transfer, *Otters, *Oil pollution, *Furbearers, *Heat balance, Animal physiology, Animal behavior, *Water temperature, Water pollution effects, Oil spills, Arctic, Alaska.
Identifiers: *Crude oil, Fur seal, Sea lion, Walrus, Thermoregulation.

Thermal conductance (C) of the sea otter and several species of pinniped pelts was determined during immersion, after oiling, and after cleaning. Most affected by oiling was the sea otter pup in which (C) was doubled. Least affected was the sea lion in which no change in (C) occurred. Washing slightly reduced (C) of the adult otter and fur seal. The results indicated that even a light oiling would have marked detrimental effects on the thermoregulatory abilities of otters and fur seal at sea. The thermal effects of oiling on other adult pinnipeds while at sea would be slight. (See also W78-00572) (Katz)
W78-00586

BIOAVAILABILITY OF SEDIMENT-SORBED NAPHTHALENES TO THE SIPUNCULID WORM, PHASCOLOSOMA AGASSIZII,
Battelle Pacific Northwest Labs., Sequim, WA. Marine Research Labs.
J. W. Anderson, L. J. Moore, J. W. Blaylock, D. L. Woodruff, and S. L. Kiesser.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 276-285, 1977. 2 fig, 4 tab, 11 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Sediments, *Worms, *Bottom sediments, *Sediment-water interfaces, Aquatic animals, Organic compounds, Chemical analysis, Spectrophotometry, Pollutant identification.
Identifiers: *Crude oil, Bioaccumulation, Depuration, *Naphthalene, Tissue analysis, Sipunculid worms, Prudhoe Bay crude.

The peanut worm was exposed to petroleum hydrocarbons from Prudhoe Bay crude (PBC) oil. Uptake and release of naphthalene and alkylnaphthalenes were compared for worms exposed to hydrocarbons in solution, oil on the surface of sediments and oil mixed in sediment. Sipunculids exposed for 24 hr to a water-soluble fraction of PBC contained from 2 to 10 times the concentration of naphthalenes initially in the water. Depuration of naphthalenes was rapid when worms were transferred to clean water and/or sediment. After two weeks of depuration, both water- and sediment-exposed worms released napthalenes to background levels. From these results it does not appear that significant bioaccumulation of naphthalenes occurs from hydrocarbon fractions bound to sediment. (See also W78-00572) (Katz)
W78-00601

FACTORS AFFECTING THE RETENTION OF A PETROLEUM HYDROCARBON BY MARINE PLANKTONIC COPEPODS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
R. P. Harris, V. Berdugo, E. D. S. Corner, C. C. Kilvington, and S. C. M. O'Hara.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 286-304, 1977. 6 fig, 7 tab, 29 ref.

Descriptors: *Aromatic compounds, Oil, *Oil pollution, *Oil spills, *Tracers, *Radioactivity techniques, *Zooplankton, *Copepods, *Absorbtion, Animal physiology, *Animal metabolism, Retention, Organic compounds, Regression analysis.
Identifiers: *Naphthalene, Depuration, Bioaccumulation, Tissue analysis.

14C-1-Naphthalene was used as a model compound to study the retention of an aromatic hydrocarbon by marine planktonic copepods during 24-hour exposure experiments. Seven species were investigated, including representative estuarine, neritic and oceanic forms. Significant positive correlations were demonstrated between naphthalene retention and copepod size measure as dry weight and total lipid content; but a negative correlation was observed with temperature, and retention was diminished in animals starved for progressively longer periods. Amounts of the hydrocarbon absorbed on the surfaces of the animals appeared to be only a small fraction of the totals accumulated. (See also W78-00572) (Katz)
W78-00602

INTERLABORATORY CALIBRATION FOR THE ANALYSIS OF PETROLEUM LEVELS IN SEDIMENT,
National Bureau of Standards, Washington, DC. Analytical Chemistry Div.
S. A. Wide, S. N. Chesler, B. H. Gump, H. S. Hertz, and W. E. May.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 345-350, 1977. 2 fig, 1 tab, 3 ref.

Descriptors: *Laboratory tests, *Gas chromatography, Oil, *Oil pollution, *Spectroscopy, *Chemical analysis, *Standards, *Analytical techniques, *Sediments, Calibration, Instrumentation, Research equipment, Variability, Quality control, Aromatic compounds, Intertidal areas.

The large number of environmental analysis to be performed in the future necessitates the existence of a common basis for comparing the data. Otherwise data obtained from different laboratories would be of limited usefulness. Furthermore, unless the data can be put on an equivalent basis, environmental standards can neither be set nor enforced. A sediment sample was split between two laboratories as an intercalibration exercise. The similarities and differences of the two results were discussed. (See also W78-00572) (Katz)
W78-00607

DETERMINATION OF THE LEEWAY OF OIL SLICKS,
Virginia Inst. of Marine Science, Gloucester Point.
C. L. Smith.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 351-362, 1977. 4 fig, 4 tab, 33 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, Winds, *Water circulation, *Currents(Water), Movement, *Weather data, *Wind velocity, *Aerial photography, Air-water interfaces, Mathematical studies, Forecasting.
Identifiers: *Crude oil, *Oil slicks, Leeway.

The leeway of oil slicks was determined as a function of wind velocity in the range of 5-25 knots to enable more precise forecasting of the trajectory of oil spills, and thus aid effective containment and cleanup operation. Leeway was calculated by measurement of the separation of oil slicks from a dyed patch of surface water at sea, using time-sequenced nadir aerial photography. Five oil types, Nos. 2, 4, and 6 fuel oils, and light and heavy crude oils, were found to exhibit similar leeway as a function of wind speed. Oil spill volume had no measurable effect on leeway, and slicks moved in the direction of the wind. The leeway increases with sea state and obeys a linear relationship with wind velocity in the wind ranges studied. (See also W78-00572) (Katz)
W78-00609

INTERTIDAL SEDIMENT HYDROCARBON LEVELS AT TWO SITES ON THE STRAIT OF JUAN DE FUCA,
National Marine Fisheries Service, Seattle, WA. Northwest Fisheries Center.
W. D. MacLeod, Jr., D. W. Brown, R. G. Jenkins, and L. S. Ramos.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 385-396, 1977. 7 fig, 4 tab, 11 ref.

Descriptors: *Oil, *Oil pollution, *Gas chromatography, *Sediments, *Intertidal areas, Chemical analysis, Analytical techniques, *Washington, *Mass spectrometry, *Monitoring, *Indicators, Baseline studies, Organic compounds, Pipelines.
Identifiers: *Alkanes, *Arenes, *Naphthalene, *Puget Sound(Washington).

Hydrocarbon baseline data are needed to assess the potential impact of oil pollution from tanker traffic in the Strait of Juan de Fuca. Initial studies were directed to intertidal sediments from two physically similar areas along the shipping lanes:

Port Angeles, WA and Dungesess Bay, WA. Latest analytical techniques such as solvent/slurry extraction, silica gel chromatography, and glass capillary GC were adapted for analyzing large numbers of intertidal sediments efficiently and expeditiously. It was suggested that arenes be monitored as indicators of oil pollution; over ten arenes are proposed for baseline analyses and monitoring. (See also W78-00572) (Katz)
W78-00611

CHARACTERIZATION OF VOLATILE HYDROCARBONS IN FLOWING SEAWATER SUSPENSIONS OF NUMBER 2 FUEL OIL,
Battelle-Pacific Northwest Labs., Richland, WA.
R. M. Bean, and J. W. Blaylock.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 397-403, 1977. 4 fig, 1 tab, 12 ref.

Descriptors: *Gas chromatography, *Mass spectrometry, Oil, *Oil pollution, *Helium, *Chemical analysis, *Aromatic compounds, *Volatility, *Bioassay, *Pollutant identification, *Solubility, Organic compounds, Laboratory tests, Methodology.
Identifiers: No. 2 fuel oil, Helium partition gas chromatography.

Dilute suspensions of No. 2 fuel oil in seawater (less than one milligram per liter) have been analyzed for monocyclic aromatic hydrocarbons using helium partition gas chromatography. The methodology permits routine quantitation of volatile aromatic constituents at concentrations well below one microgram per liter. (See also W78-00572) (Katz)
W78-00612

SEDIMENT HYDROCARBONS AS ENVIRONMENTAL INDICATORS IN THE NORTHEAST GULF OF MEXICO,
Gulf Coast Research Lab., Ocean Springs, MS.
J. S. Lytle, and T. F. Lytle.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems., D.A. Wolfe, Ed., Pergammon Press, p. 404-412, 1977. 5 fig, 2 tab, 42 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Indicators, *Sediments, Sediment-water interfaces, *Bottom sediments, *Offshore platforms, *Continental shelf, Seasonal, Gulf of Mexico, Organic compounds, Mississippi, Florida, Alabama.
Identifiers: *Crude oil, *Olefins, *Alkanes.

Surface sediment samples were collected in 1975-76 from forty-five locations in the Gulf of Mexico along the continental shelf from Pascagoula, Mississippi to Fort Myers, Florida. Hydrocarbons were analyzed in the sediments for the Bureau of Land Management in an effort to survey hydrocarbons in the northeast Gulf and detect man-induced and seasonal effects in hydrocarbon profiles. There are three zones in this area as distinguished by their aliphatic hydrocarbon distributions. (See also W78-00572) (Katz)
W78-00613

SEASONAL VARIATIONS OF HYDROCARBONS IN THE WATER COLUMN OF THE MAFLA LEASE AREA,
Florida State Univ., Tallahassee. Dept. of Oceanography.
J. A. Calder.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 432-441, 1977. 4 fig, 3 tab, 10 ref.

Descriptors: Oil, *Oil pollution, *Gas chromatography, *Gulf of Mexico, *Offshore platforms, *Suspended solids, *Seasonal, *Aromatic compounds, *Zooplankton, Organic compounds, Biomass, Chemical analysis, Mississippi River, Pollutant identification.
Identifiers: *Biogenic hydrocarbons, *Aliphatic compounds.

A series of 15 stations in the northeast Gulf of Mexico were occupied during summer, fall and winter 1975-76. Samples were collected and analyzed by gas chromatography for dissolved hydrocarbons and those associated with suspended particulate material. Concentrations were higher near shore. Unresolved components were present in both dissolved and particulate phases, especially near the Mississippi River and Sound which may be the source of the material. (See also W78-00572) (Katz)
W78-00616

BAYESIAN MODEL DISCRIMINATION FOR BOD ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
T. W. Constable, and E. A. BcBean.
Canadian Journal of Civil Engineering, Vol. 4, No. 3, p 371-379, September 1977. 8 fig, 4 tab, 13 ref.

Descriptors: *Model studies, *Biochemical oxygen demand, *Water pollution control, Waste water(Pollution), Treatment facilities, Probability, Simulation analysis, Equations, Systems analysis, Waste water treatment.
Identifiers: *Bayesian techniques, *Model discrimination techniques, *Hsiang-Reilly method, Primary influent, Nonlinear models, Water quality data.

The Hsiang-Reilly method, a discrete Bayesian model discrimination technique, is employed to select the best model of several alternative models to describe data relating observed BOD exertion as a function of time. Use of this approach avoids the need for linearization of equations and results in distributed probability estimates of the parameter magnitudes rather than simply point estimates. A case study application to the raw influent and primary effluent of the Waterloo Pollution Control Plant is included. The results indicate that although a three-parameter model often gives a better fit to observed BOD data than the two-parameter first-order model, differences between the BOD-progression curves for the models are often so small as to be insignificant. In view of these small differences, and considering that none of the proposed models could adequately describe observed deviations from the exponential BOD curves, the use of the first-order equation to describe BOD-progression relationships for the Waterloo Pollution Control Plant appears to be justified. (Bell-Cornell)
W78-00620

DESIGN OF TREND MONITORING NETWORKS,
Washington Univ., Seattle. Center for Quantitative Science in Forestry, Fisheries, and Wildlife.
D. P. Lettenmaier, and S. J. Burges.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol. 103, No. EE5, Proceedings Paper 13257, p 785-802, October 1977. 4 fig, 5 tab, 24 ref, 3 append.

Descriptors: *Network design, *Water quality, *Monitoring, *Model studies, Mathematical models, Statistics, Statistical models, Filters, Stochastic processes, Sampling, Networks, Streams, Rivers, Watershed(Basins), Pollutants, Dissolved oxygen, Nitrogen, Coliforms, Temperature, Water temperature, Pollution, Water pollution.

The design of trend monitoring networks requires specification of both sampling frequencies and station locations. The extended Kalman filter, an algorithm that incorporates the imprecise knowledge of stream quality dynamics, was used to predict the variance of prediction of 8 water quality constituents (DO, PO4-P, NO3-N, NO2-N, NH3-N, fecal coliform, and temperature) as a function of distance downstream from a station. By setting a criterion of maximizing average trend detection power over a river basin, optimal combinations of sampling frequency and number of stations were determined for a fixed constraint on the total basin-wide sampling effort. The results showed that, in general, station placement is far less critical than the number of stations used. For most small- to moderate-sized basins and typical constraint levels faced by managing agencies, the optimum sampling program will have very few stations (often only one) with relatively high sampling frequencies at each station. (Sims-ISWS)
W78-00695

SOME EFFECTS OF DUSTFALL ON URBAN STORMWATER QUALITY,
Enviro-Measure, Inc., Knoxville, TN.
M. P. Barkdoll, D. E. Overton, and R. P. Betson.
Journal Water Pollution Control Federation, Vol. 49, No. 9, p 1976-1984, September 1977. 7 fig, 5 tab, 10 ref. U-910367-01-0.

Descriptors: *Fallout, *Water pollution, *Storm water, *Urban runoff, *Water quality, *Air pollution, Water pollution sources, Storm runoff, Rainfall, Watersheds(Basins), Heavy metals, Nutrients, Pollutants.
Identifiers: *Urban storm water quality.

Runoff from 47 storms in a small urban watershed was analyzed for 16 water contaminants. Dustfall also was collected and analyzed. There were 2 distinct but overlapping groups of contaminants found in the storm water quality analysis. Minerals and solids had relatively constant concentrations from storm to storm, whereas, heavy metals, nutrients, and chemical oxygen demand had decreasing concentrations with increasing storm water discharge. Further, chemical oxygen demand, Hg, Cl, Pb, SiO2, PO4, and As significantly influence storm water quality. Chemical oxygen demand, Hg, Cl, As, and PO4 are caused primarily by dustfall. The relative influence of dustfall for other constituents will have to be verified by further study. Pervious area in urban watersheds should not be disregarded in determining pollutant yields. Models using only street surface contaminants will yield conservative results. Removal was found to be a function of storm runoff volume and only mildly affected by runoff rates. Certain pollutants such as suspended solids, Ca, Mg, SO4, and CaCO3 are available in extremely large quantities. The constituents probably arise from the erosion of disturbed land areas. (Henley-ISWS)
W78-00697

COLORIMETRIC METHOD OF DETERMINATION OF AMIBEN IN AIR, WATER AND SOIL,
Kiev Inst. for the Advanced Training of Physicians (USSR).
L. S. Samosvat, and I. V. Voynova.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 143, Price codes: A02 in paper copy, A01 in microfiche. FID-ID(RS)I-1310-75, Wright-Patterson Air Force Base, Ohio, Foreign Technology Division, May 7, 1975. 5 p, 1 tab.

Descriptors: *Herbicides, *Agricultural chemicals, *Analytical techniques, *Testing procedures, *Chemical analysis, Weed control, Color reactions, Properties, Agriculture, Chemicals, Air, Analysis, Atmosphere, Chemistry, Soil analysis, *Pollutant identification.
Identifiers: *Amiben, *Colorimetric method.

Amiben, 3-amino-2, 5-dichlorobenzoic acid, is determined by reacting amiben with sodium nitrite in an acid medium, then reacting the phenyldiazonium salt obtained with 1-naphthol in an alkaline medium. Methods for extracting amiben from aerosol air filters, water, and soil were included. (Henley-ISWS)
W78-00700

POLYCYCLIC AROMATICS IN SURFACE AND GROUND WATER,
J. Borneff.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-238 786-T, Price codes: A15 in paper copy, A01 in microfiche. EPA-TR 498-74, Environmental Protection Agency, Research Triangle Park, North Carolina, 1974. 22 p, 2 fig, 2 tab, 17 ref. Translated from SchrReihe Ver. Wass.-Boden-Lufthyg., p 53-65, 1973.

Descriptors: *Aromatic compounds, Pollutants, *Surface water, *Groundwater, *Water pollution sources, Water chemistry, Analytical techniques, Organic compounds, Water quality, Water pollution, Chemical analysis, Dusts, Aerosols, Soil contamination, Chemistry, *Pollutant identification, Foreign research.
Identifiers: *Polycyclics aromatics, *Carcinogens.

Carcinogenic polycyclic aromatics belong to the chronically effective harmful substances in drinking water, which are partly from natural origin and partly caused by pyrolytic processes. Since the aromatics appear in particularly high concentrations in waste water, they are significant as pollution possibilities. Their elimination from drinking water is necessary, although a small residual content of polycyclic concentrations in groundwate can be tolerated. In river water, 1/3 of the aromatics appear in corpuscular form, 1/3 is finely dispersed, and the rest actually is dissolved. In modern treatment plants, 2/3 of the aromatics can be eliminated by means of sedimentation, flocculation and filtration, the rest can be reduced by oxidation or A-carbon treatment to harmless residuals. It is believed that aromatics analysis represents a significant supplement to the customary research of drinking water: analysis application also is recommended by the WHO to assure the good taste and harmlessness of water. (Henley-ISWS)
W78-00702

THE NATURE AND BEHAVIOR OF GASES IN NATURAL WATERS,
Geological Survey of Canada, Ottawa (Ontario). Resource Geophysics and Geochemistry Div.
For primary bibliographic entry see Field 2K.
W78-00712

1975 ANNUAL REPORT.
National Oceanic and Atmospheric Administration, Oak Ridge, Air Resources Atmospheric Turbulence and Diffusion Laboratory, TN.
Report ATDL-76/14, September 1976. 583 p.

Descriptors: *Air pollution, *Diffusion, *Dispersion, *Model studies, Mathematical models, Pollutants, Path of pollutants, Industries, Powerplants, Cities, Theoretical analysis, Computer models, Solar radiation, Forests, Cooling towers, Winds, Meteorology.
Identifiers: *Plumes, Plume rise.

Research contributions for 1975 were compiled. Most of the contributions were concerned with the diffusion of air pollutants from power plants and other industries. Other subjects discussed were smog, solar radiation in forests, cooling towers, plume rise, and wind effects. Mathematical models were described in most of the papers. (See W78-00722 thru W78-00741), (Sims-ISWS)
W78-00721

SUMMARY OF ACTIVITIES AND PLANS-FY 1976-1977,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
R. P. Hosker, Jr., and R. A. Green.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 1-15, September 1976. 28 ref.

Descriptors: *Air pollution, *Path of pollutants, *Projects, *Model studies, Mathematical models, Powerplants, Cooling towers, Sulphur, Atmosphere, Environment, Pollutants, On-site investigations, Forests, Convection, Meteorology.
Identifiers: Plumes.

The Atmospheric Turbulence and Diffusion Laboratory (ATDL) in Oak Ridge, Tennessee, is operated for the Energy Research and Development Administration (ERDA) by the National Oceanic and Atmospheric Administration's (NOAA) Air Resources Laboratories, a group of research units generally concerned with problems of environmental pollution and its control. The ATDL is organized to perform research studies on atmospheric diffusion, transport, and removal of pollutants, including heat, and moisture with most emphasis on scales up to regional size (up to approximately 200 km). Current research programs include air transport studies, especially for the eastern Tennessee region; air pollution studies, including the meteorological effects of cooling towers and energy centers; research on plume and wake behavior, including effects of buoyancy, active thermal convection, and removal processes; extension of atmospheric transport, diffusion, and effluent removal models to special situations such as over-water and over-forest flows; and study of the role of forest structure on the energy balance and on diffusion. (See also W78-00721) (Sims-ISWS)
W78-00722

METEOROLOGICAL EFFECTS OF ENERGY DISSIPATION AT LARGE POWER PARKS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
S. R. Hanna, and F. A. Gifford.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 17-24, September 1976. 3 tab, 34 ref.

Descriptors: *Air pollution effects, *Cooling towers, *Meteorology, Fog, Clouds, Powerplants, Convection, Moisture content, Heat, Energy, Cloud physics, Drops(Fluids), Nuclear powerplants, Electric powerplants, Thermal powerplants.
Identifiers: Plumes, Vorticity, Large power parks.

Large (10,000 to 50,000 MW) power parks are being studied as one means of satisfying the nations's demand for energy. The dissipation of waste energy from these installations may result in significant meteorological effects. It was shown that the rate of atmospheric dissipation of the waste energy from power parks is approximately equal to the atmospheric dissipation of energy by geophysical phenomena such as thunderstorms, volcanoes, and large bushfires. Cumulus clouds and whirlwinds often be concentrated by large power parks. A theory of multiple plume rise was used to estimate the enhancement of plume rise from multiple cooling towers. Calculations were made of plume rise, ground level fog intensity, and drift deposition due to plume rise from 50 towers was estimated to be more than 110% of that from a single tower if the tower spacing is less than about 300 m. At locations within 100 km of the cooling towers, excess fog will occur about 1 or 2% of the time. The vapor plume will be appreciably longer than those from earth satellites most of the time. Since there are no power parks of this magnitude yet in existence, there are no measurements to test the calculations. The conclusions were highly tentative and indicated that much more research is required on the subject. (See also W78-00721) (Sims-ISWS)
W78-00723

TURBULENT DIFFUSION-TYPING SCHEMES: A REVIEW,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
F. A. Gifford.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 25-43, September 1976. 8 fig, 8 tab, 94 ref.

Descriptors: *Diffusion, *Turbulence, *Air pollution, Air circulation, Path of pollutants, Pollutants, Mixing, Reviews, Powerplants, Effluents, Winds, Meteorology.
Identifiers: *Diffusion-typing schemes.

Recent environmental concerns have increased greatly the need for turbulent typing schemes in atmospheric diffusion calculations. The standard methods by Brookhaven National Laboratory, Pasquill, the Tennessee Valley Authority, and others were reviewed, and differences, inconsistencies, and modifications to the basic schemes were discussed. Various exceptional flows occur to which existing turbulence typing schemes should not be applied directly: diffusion in near-calm, very stable conditions; diffusion over cities, water bodies, and irregular terrain; and diffusion in building wakes and near highways. Possible modifications to typing schemes in these cases were discussed. In all such exceptional cases, many more observational data are needed before reliable diffusion estimates can be made. (See also W78-00721) (Sims-ISWS)
W78-00724

PHOTOGRAPHIC ASSESSMENT OF DECIDUOUS FOREST RADIATION REGIMES,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00725

MODELING SMOG ALONG THE LOS ANGELES-PALM SPRINGS TRAJECTORY,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 221-263, September 1976. 12 fig, 4 tab, 42 ref.

Descriptors: *Smog, *Winds, *California, *Model studies, Mathematical models, On-site data collections, Pollutants, *Air pollution, Air circulation, Solar radiation, Path of pollutants.
Identifiers: *Southern California, *Los Angeles(Calif), *Palm Springs(Calif), Oxidants.

Observations of smog concentrations and wind patterns during the summer of 1973 in Los Angeles, Pomona, Riverside, Banning, and Palm Springs were presented. The observations showed that high oxidant concentrations at Banning and Palm Springs were presented. The observations showed that high oxidant concentrations at Banning and Palm Springs often are due to advection of smog from source regions in the more densely populated western part of the Los Angeles basin. A Pomona and Riverside, advection from upwind source regions combines with the effects of local emissions to cause long durations of high oxidant concentrations with peak times in the mid afternoon. An empirical model for the diurnal oxidant variation was suggested which satisfactorily simulates observed concentrations. More complex models which include chemical kinetics systems do not perform very satisfactorily at the rural stations of Banning and Palm Springs, especially at night when observed oxidant concentrations remain high. (See also W78-00721) (Sims-ISWS)
W78-00726

RESEARCH REQUIRED FOR PREDICTING THE BEHAVIOR OF PRESSURIZED GASES ESCAPING INTO THE ATMOSPHERE,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
G. A. Briggs.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 265-291, September 1976. 1 tab, 8 ref.

Descriptors: *Air pollution, *Gases, *Pressure, *Behavior, Winds, Atmosphere, Density, Temperature, Entrainment, Air entrainment, Expansion, Buoyancy, Mixing, Fluid mechanics.
Identifiers: Gas releases, Plumes.

The prediction of the behavior of pressurized gases accidentally released into the atmosphere requires many considerations, among which are thermodynamics, momentum, buoyancy (positive and negative), entrainment, and ambient wind and temperature structure. The areas were outlined that need to be considered and possible lines of research if the literature indicates the present state of knowledge is inadequate. (See also W78-00721) (Sims-ISWS)
W78-00727

TIME DEPENDENT MESOSCALE WIND FIELDS OVER COMPLEX TERRAIN,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00728

ATMOSPHERIC DISPERSION MODELS FOR ENVIRONMENTAL POLLUTION APPLICATIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
F. A. Gifford.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 311-335, September 1976. 6 fig, 2 tab, 105 ref.

Descriptors: *Air pollution, *Dispersion, *Model studies, Reviews, Winds, Mixing, Atmosphere, Diffusion, Mathematical models, Powerplants, Meteorology.
Identifiers: Plumes, Air pollution sources.

Pollutants are introduced into the air by many of man's activities. The potentially harmful effects they can cause are, broadly speaking, of 2 kinds: long-term, possibly large-scale and wide-spread chronic effects, including long-term effects on the earth's climate; and acute, short-term effects such as those associated with urban air pollution. This paper was concerned with mathematical cloud or plume models describing the role of the atmosphere, primarily in relation to the acute effects of air pollution, i.e., those effects arising from comparatively high concentration levels. (See also W78-00721) (Sims-ISWS)
W78-00729

URBAN DIFFUSION PROBLEMS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 337-356, September 1976. 4 fig, 4 tab, 95 ref.

Descriptors: *Air pollution, *Cities, *Model studies, Diffusion, Turbulence, Winds, Temperature, Mathematic models, Statistical models, Computer models, Pollutants, Path of pollutants, Meteorology.
Identifiers: *Urban diffusion models.

Emphasis was placed on the factors that cause diffusion in urban areas to present special problems or to differ from diffusion in other environments. Because of the obvious problems of urban air pollution and the stringent regulations laid down by governments, there has been a great increase in the number of observation programs and theoretical and applied studies of urban diffusion. But since most of the work has been directed towards solving local problems, there have been relatively few advances in the science of estimating urban air pollution. Studies tend to concentrate on monitoring programs or on straightforward application of existing techniques. Many of the studies are quite complex due to the large number of computer calculations which must be made in the process of insuring numerical stability or of accounting for the multiple sources and receptors. It is hoped that urban diffusion models can eventually be used confidently to make major decisions, such as in planning the lay-out of a new industrial park, in determining the effects of a new highway on air quality, or in estimating the results of a new automobile emissions exhaust system. (See also W78-00721) (Sims-ISWS)
W78-00730

RELATIVE DIFFUSION OF TETROON PAIRS DURING CONVECTIVE CONDITIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00731

DISPERSION OF SULFUR DIOXIDE EMISSIONS FROM AREA SOURCES,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
F. A. Gifford, and S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 365-376, September 1976. 7 fig, 2 tab, 4 ref.

Descriptors: *Air pollution, *Sulfur compounds, *Dispersion, Winds, Data processing, Analytical techniques, Forecasting, Mathematical models, Pollutants, Path of pollutants, Meteorology.
Identifiers: *Sulfur dioxide, Area sources.

An evaluation is presented of surface concentrations of sulfur dioxide emitted generally over an area. The most common example of an area source was provided by urban domestic and industrial heating, for which it is necessary to consider the sum of a large number of individual sources over an area of some convenient size. Given an area-source inventory, this paper provides a simple, systematic procedure for calculating the surface concentration at any point, averaged over an hour, a day, or a year. Area-source concentration calculations are a recent development compared with calculations of concentrations from isolated sources. There are discussions of some of the methods now available, but these all require the use of a high-speed electronic computer. The method described, although very simple, was shown to provide results of a precision comparable with that of the more elaborate computer calculations and can be used with confidence for area-source calculations in urban air pollution and regional air quality studies. An even simpler area-source calculation suitable for many air pollution control purposes also was described. The model was described in such a way that all the calculations can be done by hand. (See also W78-00721) (Sims-ISWS)
W78-00732

STANDARD DEVIATION OF WIND DIRECTION AS A FUNCTION OF TIME; THREE HOURS TO FIVE HUNDRED SEVENTY-SIX HOURS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00733

VALIDATION OF A MULTISOURCE DISPERSION MODEL FOR ATMOSPHERIC SULFUR CONCENTRATIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
W. M. Culkowski.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 389-394, September 1976. 2 tab.

Descriptors: *Sulfur compounds, *Air pollution, *Model studies, *Tennessee, Powerplants, Electric powerplants, Effluents, Pollutants, Mathematical models.
Identifiers: *Sulfur dioxide, *Walker Branch watershed(Tenn), Pollutant concentration.

Two tenths of 1% of the annual world output of sulfur dioxide, SO2, is generated within 25 km of the Walker Branch watershed. The prevailing wind pattern dictates that a substantial fraction of the effluent is transported to the vicinity of the Walker Branch area. The Air Transport Model (ATM) is the mechanism employed to estimate the concentration and/or deposition of an effluent at any given point. A test of the validity of the ATM was undertaken using data from SO2 monitoring stations established by the Tennessee Valley Authority (TVA). The location and type of monitoring stations employed were far from ideal. In addition, the tabulating requirements of TVA are often an order of magnitude more gross than the model predicts. Nevertheless, comparison of the model with TVA data showed excellent agreement. TVA supplied data for 3 parameters, SO2, suspended particulate, and settled particulate matter. Preliminary analysis indicated that only the SO2 concentrations tended to correlate with the output of the Bull Run steam plant. Accordingly, the ability of the ATM to correlate with TVA SO2 data was considered to be a valid test of the model. (See also W78-00721) (Sims-ISWS)
W78-00734

BEAM ENRICHMENT OF DIFFUSE RADIATION IN A DECIDUOUS FOREST,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 2B.
W78-00735

PLUME RISE PREDICTIONS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
G. A. Briggs.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 425-478, September 1976. 9 fig, 10 tab, 179 ref, 2 append.

Descriptors: *Air pollution, *Powerplants, *Model studies, Mathematical models, Reviews, Energy, Buoyancy, Mass, Electric powerplants, Cooling towers, Diffusion, Dispersion, Pollutants, Path of pollutants.
Identifiers: *Plumes, Plume models.

Several mathematical models used for predicting the plume rise were reviewed. In general, the models involve the conservation of mass, buoyancy, momentum, and energy. Cooling tower calculations were presented in a paper included as Appendix B. (See also W78-00721) (Sims-ISWS)
W78-00736

ASYMPTOTIC SOLUTIONS OF A SIMPLE URBAN DISPERSION MODEL FOR CHEMICAL POLLUTANTS,
Pembroke State Univ., NC. Dept. of Physics.
J. J. D'Arruda, and S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 479-498, September 1976. 1 tab, 3 ref.

Descriptors: *Air pollution, *Cities, *Model studies, Mathematical models, Pollutants, Path of pollutants, Equations, Chemicals, Winds, Diffusion, Analytical techniques.
Identifiers: Pollutant concentrations.

An analytical solution was developed for the set of partial differential equations describing the time rate of change of pollutant concentrations over an urban area, knowing the emissions source strengths, the wind speed, the height of the pollutant cloud, the length of the region, and the chemical kinetics system were used as the basis for analysis. the resulting asymptotic solutions were shown to gree to 3 significant figures with solutions obtained by numerical integration using a high speed digital computer. (See also W78-00721) (Sims-ISWS)
W78-00737

CHEMISTRY OF SULFUR IN THE ATMOSPHERE,
Oak Ridge National Lab., TN.
C. F. Baes, Jr., J. T. Holdeman, and W. M. Culkowski.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 503-506, September 1976. 7 ref.

Descriptors: *Sulfur compounds, *Model studies, *Mathematical models, Chemistry, Aerosols, Powerplants, Acids, Humidity, Temperature, Pollutant, Path of pollutants, Air pollution, Ions, Chemicals.
Identifiers: Plumes.

Industrially produced sulfur enters the atmosphere in reactive forms, primarily SO2 and SO3, that should not be treated as inert pollutants for purposes of modeling. Since June of 1974, an effort has been under way to describe the equilibrium and kinetic aspects of sulfur chemistry in a form suitable for inclusion in the atmospheric transport model (ATM) being developed at Oak Ridge National Laboratory. A computer program has been written which calculates the amount and composition of aerosol and the equilibrium partial pressure of the gases. The program in its present form (SULCAL) calculates the composition of the aerosol and the partial pressure of SO2 in a power plant plume as a function of the distance downwind from the source. (See also W78-00721) (Sims-ISWS)
W78-00738

PREDICTED AND OBSERVED COOLING TOWER PLUME RISE AND VISIBLE PLUME LENGTH AT THE JOHN E. AMOS POWER PLANT,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
S. R. Hanna.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 509-551, September 1976. 5 fig, 6 tab, 26 ref.

Descriptors: *Cooling towers, *Effluents, *Model studies, Mathematical models, Powerplants, Electric powerplants, Heat, Water vapor, Humidity, Winds, Drops(Fluids), Clouds, Cloud physics, Effects, Meteorology.
Identifiers: Plumes, Plume rise, Plume models.

A one-dimensional numerical cloud growth model and several empirical models for plume rise and cloud growth were compared with 27 sets of observations of cooling tower plumes from the 2900 MW John E. Amos power plant in West Virginia. The 3 natural draft cooling towers are 200 m apart. In a cross wind, the plumes began to merge at a distance of about 500 m downwind. In calm conditions, with reduced entrainment, the plumes often did not merge until heights of 1000 m. The average plume rise, 750 m, was predicted well by the models, but day-to-day variations were simulated with a correlation coefficient of about 0.5. Model predictions of visible plume length agreed, on the average, with observations for visible plumes of short to moderate length (less than about 1 km). The prediction of longer plumes was hampered by the lack of knowledge of plume spreading after the plumes level off. Cloud water concentrations predicted by the numerical model agreed with those measured in natural cumulus clouds (about 0.1 to 1 g/kg). (See also W78-00721) (Sims-ISWS)
W78-00739

A NOTE ON DIFFUSION FROM SOME SIMPLE EXTENDED SOURCES TREATED AS A COLLECTION OF GAUSSIAN POINT SOURCES,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
P. Ulriksen.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 553-576, September 1976. 6 fig, 12 ref.

Descriptors: *Diffusion, *Air pollution, *Model studies, Mathematical models, Highways, Effluents, Dispersion, Industries, Powerplants, Pollutants, Path of pollutants.
Identifiers: *Air pollution sources.

The common use of the Gaussian diffusion formula for estimating concentrations of a contaminant emitted from a point source has led to extension of the method to line and area sources. In practical applications, highways usually are treated as infinite line sources, while domestic and small industrial emissions become area sources, divided into small squares, each one represented by a point source. The approximations of finite line sources by infinite lines, or of area sources by point sources, are valid only within a certain distance range, a fact not always taken into account. This note examined the behavior of several simple extended sources, treated as summations of point sources, each having a Gaussian diffusion pattern. Line sources, vertical area sources, and horizontal area sources were included. Line and horizontal area sources are common in air pollution problems. Vertical area sources are not usual in atmospheric diffusion but can be found in some problems of fluid mechanics or oceanic applications. (See also W78-00721)
W78-00740

ESTIMATION OF DOWNWASH EFFECTS,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
G. A. Briggs.
In: 1975 Annual Report; Report ATDL-76/14, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tennessee, p 577-583, September 1976. 1 tab, 5 ref.

Descriptors: *Air pollution, *Effluents, *Model studies, Mathematical models, Industries, Powerplants, Buildings, Winds, Effects, Pollutants, Path of pollutants, Equations.
Identifiers: *Downwash effects, Downwash, Stacks.

Reported was a simplified approach to the calculation of ground level concentrations of effluents from small industrial and fuel-burning installations. It was intended to serve as a first approximation to a very complex process. Because each stack, building, and terrain configuration is different, actual ground concentration frequently may differ from the values calculated here by a factor of 2. The procedures given were designed especially for source heights of less than 100 m; some of the simplifications made are not valid for large emissions. This paper gave a method for predicting the occurrence of downwash. Downwash is a common occurrence with small emissions and greatly increases ground concentrations in the immediate vicinity downwind of the source. (See also W78-00721) (Sims-ISWS)
W78-00741

APPLICATION OF NUMERICAL CLASSIFICATION IN ECOLOGICAL INVESTIGATIONS OF WATER POLLUTION,
Virginia Inst. of Marine Sciences, Gloucester Point, VA.
For primary bibliographic entry see Field 6G.
W78-00771

ENVIRONMENTAL ASSESSMENT PERSPECTIVES,
GCA Corp., Bedford, MA. GCA Technology Div.
For primary bibliographic entry see Field 5G.
W78-00773

MAPS SHOWING GROUND-WATER CONDITIONS IN THE NORTHERN PART OF THE CHINLE AREA, APACHE COUNTY, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00802

MAPS SHOWING GROUND-WATER CONDITIONS IN THE MONUMENT VALLEY AND NORTHERN PART OF THE BLACK MESA AREAS, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00803

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SOUTHERN PART OF THE BLACK MESA AREA, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00804

JARRETTSVILLE QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00805

BEL AIR QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00806

GROUND-WATER RESOURCES OF THE ALLUVIAL AQUIFERS IN NORTHEASTERN LARIMER COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00811

WATER RESOURCES OF THE MAUNABO VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-00813

WATER RESOURCES DATA FOR OREGON, WATER YEAR 1975.
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00817

WATER RESOURCES DATA FOR MARYLAND AND DELAWARE, WATER YEAR 1976.
Geological Survey, Towson, MD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00818

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1976.
Geological Survey, Bismarck, ND. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-00819

RECONNAISSANCE OF WATER QUALITY IN THE DUCHESNE RIVER BASIN AND SOME ADJACENT DRAINAGE AREAS, UTAH,
Geological Survey, Salt Lake City, UT. Water Resources Div.
J. C. Mundorff.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 55, 1977. 47 p, 9 fig, 5 plates, 2 tab, 17 ref.

Descriptors: *Water quality, *Streams, *Utah, *Chemical analysis, *Sediment transport, Suspended load, Water analysis, Sampling, Data collections, Streamflow, Flow rates, Storm runoff, Evaluation, Maps.
Identifiers: *Duchesne River basin(Utah).

A water-quality reconnaissance in the Duchesne River basin and some adjacent drainage areas covered an area of about 4,400 square miles. Data were obtained one or more times at 108 sites during March 1973 to September 1974 and at 49 other sites during earlier years. Dissolved-solids concentrations are low in the surface water in the northern and western parts of the basin and increase markedly in the southeastern part of the basin. The increase results predominantly from diversion of large amounts of water having low dissolved-solids concentrations from upstream parts of the basin and the return to or entry into the stream of smaller amounts of water having much higher dissolved-solids concentrations. Additional diversions of water from the upper part of the basin will cause an increase in weighted average dissolved-solids concentrations in downstream reaches of the river. Tributaries to the Duchesne and Strawberry Rivers in the southern part of the basin have high boron concentrations. Concentrations as high as 20,000 micrograms per liter were observed at the mouth of Indian Canyon. Suspended-sediment concentrations as high as 36,200 milligrams per liter were observed in runoff from a thunderstorm in the southeastern part of the area. Sediment concentrations greater than 100,000 milligrams per liter could be expected during periods of intense thunderstorm runoff in many of the southern tributaries. (Woodard-USGS)
W78-00820

GROUND WATER IN THE LAJAS VALLEY, PUERTO RICO,
Geological Survey, Ft. Buchanan, PR. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00822

QUANTITY AND QUALITY OF URBAN STORM WATER IN SOUTHEAST FLORIDA,
Geological Survey, Miami, FL. Water Resources Div.
For primary bibliographic entry see Field 3D.
W78-00824

TECHNIQUES FOR MEASURING THE EFFECTS OF NUCLEAR POWER PLANTS ON LOCAL FISH,
Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 5C.
W78-00831

A TECHNIQUE FOR MEASURING INDUSTRIAL WASTE DISPERSION RESULTING FROM OCEAN DUMPING,
EG and G Environmental Consultants, Waltham, MA.
For primary bibliographic entry see Field 5B.
W78-00832

A 96-HOUR BIOASSAY OF OTTER CREEK, OHIO,
Heidelberg Coll., Tiffin, Ohio.
B. L. Prater, and M. A. Anderson.
Journal Water Pollution Control Federation, Vol 49, No 10, p 2099-2108, 1977. 3 fig, 5 tab, 9 ref.

Descriptors: *Sediments, *Bioassay, *Toxicity, *Streams, Mayflies, Plankton, Fauna, Research and development, Design, Aquatic life, Bioindicators, Water quality, Mortality, Daphnia, Sampling, Laboratory tests, Waterfleas, *Ohio, Benthos, Invertebrates.
Identifiers: *Otter Creek(Ohio), Hexagenia limbata, Asellus communis, Daphnia magna.

A sediment bioassay was described for evaluating sediment toxicity of Otter Creek, Ohio. Hexagenia limbata, Asellus communis, and Daphnia magna were used as test species. The sediment in the lower two-thirds of Otter Creek was not found to be conductive to the support or maintenance of aquatic biota. Certain area along the creek were grossly polluted and exhibited a high mortality of all test organisms. The design, apparatus, maintenance, and operation of the sediment bioassay were demonstrated. Possible applications of the bioassay using a variety of test species were discussed. (Klein)
W78-00890

RESIDUES OF CHLORINATED HYDROCARBONS IN COD LIVERS FROM THE KIEL BIGHT IN RELATION TO SOME BIOLOGICAL PARAMETERS,
Kiel Univ. (West Germany). Inst. fuer Meereskunde.
R. Schneider, and C. Osterroht.
Berichte der Dentschen Wissenschaftliche Kommissim fur Meeresforschung, Vol 25, p 105-214, 1976/1977. 5 fig, 1 tab, 9 ref.

Descriptors: *Fish physiology, *Fish, *Chlorinated hydrocarbon pesticides, *DDT, *DDE, Dieldrin, Polychlorinated biphenyls, Path of pollutants, Bioassay, Analytical techniques, Absorption, Lipids, Sampling, Commercial fishing, Chromatography, Sampling, Laboratory tests.
Identifiers: Bioaccumulation, Tissue analysis, *Cod, *Livers, Gadus morhua, TDE, Kiel(West Germany).

Cod livers sampled from two sites in the Kiel Bight and from a fishing ground in the Kattegat were analysed for residues of DDT, TDE, DDE, dieldrin, and PCBs. The estimation of pollutants was performed by gas liquid chromatography. The organo-chlorine residue concentrations based upon the wet weights of the livers were more closely correlated to the lengths of the fish than to the lipid contents in their livers. An explanation of this length-dependence was offered. A decrease of the PCB/DDT ratio with the size of cod was explained. Livers of cod caught in the Kiel Fjord contained significantly higher concentrations of organo-chlorine residues than livers of cod caught elsewhere. The only difference in the residue levels between cod livers from the Kiel Bight and from the Kattegat was a general presence of dieldrin in the latter ones. (Klein)
W78-00891

FIELD-LABORATORY DETERMINED AVOIDANCES OF THE SPOTFIN SHINER AND THE BLUNTNOSE MINNOW TO CHLORINATED DISCHARGES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
D. S. Cherry, R. C. Hoehn, S. S. Waldo, D. H. Willis, and J. Cairns, Jr.
Water Resources Bulletin, Vol. 13, No. 5, p 1047-1055, 1977. 2 fig, 2 tab, 16 ref.

Descriptors: *Chlorine, *Effluents, *Power plants, *Chlorination, *Fish behavior, *Toxicity, *Minnow, *Shiners, Temperature, Water temperature, Heated water, Environmental effects, Water pollution sources, Water quality, Laboratory tests, On-site-investigation, Bioassay.
Identifiers: Avoidance, *Chlorine avoidance, Bluntnose minnow, Spotfin shiner, Notropis spilopterus, Pimephalus notatus.

The responses of the spotfin shiner and bluntnose minnow to intermittent chlorine discharges from a fossil fuel power plant were investigated by seine collections in the chlorinated discharge channel, and chlorine avoidances were obtained in a field laboratory at the power plant. No fish were captured by Seine during chlorination periods when total chlorine (TOR) and free chlorine (FCR) residuals were, respectively, 0.46 and 0.27 mg/l or higher at river water temperature of 12 C or less. Significant laboratory avoidances occurred at 0.10 to 0.20 mg/l TCR (0.03 to 0.14 mg/l FCR) for both species when exposed to increasing TCR concentrations of 0.10, 0.20, 0.30, and 0.40 mg/l. Responses varied with acclimation temperature (6, 12, 18, and 24 C) with no consistent trends between species. When exposed to a constant TCR concentration during any one test (0.14, 0.18, and 0.26 mg/l for the spotfin shiner and 0.11 and 0.17 mg/l for the bluntnose minnow), significant avoidances were observed at 0.26 and 0.17 mg/l for each species, respectively. In all laboratory trials, occurrence or residence times decreased with increasing chlorine concentration, with residence times as high as 64.7% at 0.10 mg/l TCR and as low as 8.3% at 0.40 mg/l being observed. (Klein)
W78-00895

TRACE METALS IN LIVER FROM BLUEFISH, TAUTOG AND TILEFISH IN RELATION TO BODY LENGTH,
Rhode Island Univ., Kingston. Dept. of Zoology.
H. C. Mears, and R. Eisler.
Chesapeake Science, Vol. 18, No. 3, p 315-318, 1977. 2 tab, 22 ref.

Descriptors: *Cadmium, *Chromium, *Copper, *Iron, *Manganese, *Nickel, *Zinc, *Metals, *Spectrophotometry, *Size, Metals, Path of pollutants, Analytical techniques, Chemical analysis, Animal growth, New Jersey.
Identifiers: Tissue analysis, *Bluefish, *Tautog, *Tilefish.

Livers from bluefish, tilefish and tautog collected during the summer of 1971 off the New Jersey coast were analyzed for Cd, Cr, Cu, Fe, Mn, Ni, and Zn by atomic absorption spectrophotometry. Liver ash from male and female tautog contained decreasing concentrations of Ni with increasing body length. Smaller males also contained greater levels of Cr and Cu in liver than large tautogs. Larger tilefish contained proportionately more Cd, Cu, and Fe in liver than smaller tilefish. Decreasing levels of Mn and Zn with body length were ap-

parent only for females. Livers from larger male bluefish were associated with higher concentrations of Fe than those from smaller males, while those from larger females contained lower concentrations of Cr than those from smaller females. The data suggest that future comparisons for trace metals which vary as a function of size be made only among fish of the same length. (Katz)
W78-00897

5B. Sources Of Pollution

AN INDUSTRIAL WASTE GUIDE TO THE MEAT INDUSTRY.
American Meat Inst., Washington, DC. Committee on Meat Packing Plant Waste Disposal.
Public Health Service, Publication No. 386, 1951, 12 p, 7 tab, 15 ref.

Descriptors: *Food processing industry, *Waste water treatment, Water analysis, *Waste identification, *Water pollution effects, *Water pollution sources, Activated sludge, Biochemical oxygen demand, Chemical precipitation, Design criteria, Flocculation, Biological treatment, Suspended solids, Trickling filters, Industrial wastes.
Identifiers: *Meat packing wastes.

The publication represents the efforts of waste technologists of the meat industry and others to develop a concise practical guide for operating and design personnel. Descriptions of plant processes, sources and quantity of wastes, character of wastes, and pollution effects of a sample of slaughterhouses and packinghouses are presented. In-plant remedial measures and treatment methods used by a sample of prominent plants are discussed. Studies and results of experiments made by the Sanitary District of Chicago, and treatment method results of four packinghouses are presented. methods and results of using sedimentation, chemical precipitation, trickling filters and activated sludge are discussed. (Prodehl-EPA, Corvallis)
W78-00508

PHOSPHATE/SEDIMENT INTERACTION IN TOLO AND LONG HARBOURS, HONG KONG AND ITS ROLE IN ESTUARINE PHOSPHORUS AVAILABILITY,
Fisheries Research Station, Aberdeen (Hong Kong).
H. P. Stirling, and A. P. Wormald.
Estuarine and Coastal Marine Science, Vol 5, No 5, p 631-642, September 1977. 5 fig, 2 tab, 16 ref.

Descriptors: *Water pollution sources, *Phosphates, *Harbors, *Sediments, Pollution, Water pollution, Pollutants, Inorganic compounds, On-site investigations, Estuaries, Adsorption, Laboratory tests, Water quality, Sampling, Testing procedure, Water properties, Clays, Foreign research, Foreign countries.
Identifiers: *Hong Kong, *Phosphorus removal.

The phosphate adsorption capacities of estuarine sediments and sediment derived from reclamation works in Tolo Harbour were determined in seawater. The influences of temperature and pH were not important in the field, but large reductions in salinity following heavy rain enhanced phosphate adsorption. Most sediments exhibited a saturation point with increasing sediment concentration, beyond which there was little further adsorption. At the increasing saturation concentrations, estuarine sediments adsorbed 71-88% of added phosphate up to at least 100 micrograms P/1, while reclamation sediment adsorbed 95%. There was significantly less adsorption from higher concentrations up to 2 mg P/1. Adsorption capacity appeared to be related to the kaolinite content of the sediments. Laboratory and field observations showed that adsorption is reversible and the sediments act as a phosphate buffer, but the steady-state value is 3-9 micrograms P/1 so desorption can occur only into unpolluted waters. The results contrast with rather higher equilibrium levels observed elsewhere. In polluted waters the sediments, especially those from land reclamation, permanently remove a large proportion of dissolved phosphate so that the danger of eutrophication should be reduced. (Humphreys-ISWS)
W78-00516

PREDICTION OF MERCURY DISTRIBUTION IN RIVER SEDIMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
A. Kudo, R. D. Townsend, and D. R. Miller.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 103, No EE4, Proceedings Paper 13128, p 605-614, August 1977. 3 fig, 4 tab, 16 ref, 1 append.

Descriptors: *Path of pollutants, *Mercury, *Sediment distribution, *Canada, *Water pollution sources, *Heavy metals, *Forecasting, Rivers, Biomass, Sediment transport, On-site investigations, Trace elements, Bed load.
Identifiers: *Bed material, *Ottawa River.

Field studies on a 4.9-km reach of the Ottawa River confirmed that mercury in the system is almost completely (approx 97%) associated with the bed sediments. However, mercury concentration varies widely in the study section and is a function of particle size and type of sediments. A laboratory study, in which the distribution of radioactive mercury among various sediment components was monitored under dynamic conditions, lead to predictions of mercury concentrations that closely matched observed field values. Sediments with high organic content, in particular the wood chips and fiber deposits common in the Ottawa River, have associated with them 50 times the amounts of mercury associated with sand particles on a weight per weight basis. The results emphasized the importance of performing material classification and binding affinity analysis. (Adams-ISWS)
W78-00517

NITRATE-NITROGEN AND CHLORIDE MOVEMENT THROUGH UNDISTURBED FIELD SOIL,
Alabama A and M Univ., Normal.
J. W. Shuford, D. D. Fritton, and D. E. Baker.
Journal of Environmental Quality, Vol. 6, No. 3, p 255-259, 1977. 1 fig, 7 tab, 10 ref.

Descriptors: *Soil water movement, *Dispersion, *On-site tests, *Pennsylvania, Soil water, Nitrates, Chlorides, Mixing, Percoltion, On-site investigations, Movement, Irrigation, Analytical techniques, Analysis, Sampling, Ion transport, Ions, *Nitrogen.
Identifiers: *Nitrate-nitrogen.

Results were presented from a field study conducted to determine whether large pores represent a major pathway for NO3-N and Cl movement through undisturbed soil. A soil containing 410 ppm NO3-N and Cl as KNO3 and KCl was added to 3 experimental field plots enclosed by wooded barriers to prevent runoff. Initial and final soil samples were taken at various profile depths for ion analyses. Most of the NO3-N and Cl added in solution moved vertically with the water through the profile. Ion movement was influenced by large soil pores between structural units. A fourth field plot was designed to compare field-measured NO3-N and Cl concentrations with theoretical calculations, using time-dependent water flow velocity and dispersion equations. Soil solution samples were taken for ion analyses. Due to the incomplete mixing of water and ions with all soil pores, theoretical equations did not completely explain the field-measured NO3-N and Cl distribution. (Humphreys-ISWS)
W78-00520

COMPUTATIONAL HYDRAULICS: AN ALTERNATIVE VIEW,
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
M. B. Abbott, and M. P. Vium.
Journal of Hydraulic Research, Vol. 15, No. 2, p 97-123, 1977. 11 fig, 39 ref, 3 append.

Descriptors: *Mathematical models, *Hydraulics, *Finite element analysis, *Water pollution, Boundary processes, Dispersion, Numerical analysis, Mathematical studies, Methodology.
Identifiers: *Computational hydraulics, Inverse schemes, Alternative methods.

Problems usually are posed in terms of determining what happens at given places and times. Problems can be posed alternatively by asking at which place a given event occurs at a given time. The main interest of inverse schemes, however, is not to immediate applications, but to their value in relativizing the direct schemes. The direct schemes work best when space variations in the quantities of interest are of the same order of magnitude over most of the computational domain, while inverse schemes are well-suited to situations where areas of interest are concentrated in small regions of the domain. Examples are the spillage, transport and dispersion of pollutants in watercourses, the propagation of Tsunamis waves, biochemical process at air-water and bed-water interfaces, and the transport of short wave energy. The alternative methods provide a generally superior resolution in these situations, as compared with the traditional ones, but this advantage is bought at the cost of an increased complexity of the numerical schemes or algorithms. (Singh-ISWS)
W78-00524

PREDICTING ESTUARINE SALINITY FROM RIVER INFLOWS,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W78-00526

NITRIFICATION AND DENITRIFICATION IN MARINE SEDIMENTS FROM PUGET SOUND,
Washington Univ., Seattle. Dept. of Oceanography.
V. Grundmanis, and J. W. Murray.
Limnology and Oceanography, Vol. 22, No. 5, p 804-813, September 1977. 5 fig, 5 tab, 27 ref. IDOE-NSF DES75-03618.

Descriptors: *Sounds, *Washington, *Nitrification, *Denitrification, Sediments, Connate water, Limnology, Coasts, Sampling, On-site investigations, Analytical techniques, Analysis, Nitrates, Nitrites, Nitrogen cycle, Ammonia, Water quality, Water analysis, Distribution patterns, Path of pollutants.
Identifiers: *Pudget Sound(Wash).

The anomalous interstitial water chemistry in Puget Sound sediments (200-m water depth) indicates an intermediate zone at 20- to 30-cm depths which consists of a mixture of 90% interstitial water and 10% bottom water. Irrigation by burrowing benthic organisms is believed responsible. The vertical distribution of interstitial ammonia, nitrate, and nitrite indicates that nitrification is occurring in the intermediate sedimentary zone, with oxygen being supplied by the irrigation process. Above and below the intermediate zone, denitrification predominates. (Humphreys-ISWS)
W78-00537

THE SULFUR CYCLE OF A COASTAL MARINE SEDIMENT (LIMFJORDEN, DENMARK),
Aarhus Univ. (Denmark). Inst. of Ecology and Genetics.
B. B. Jorgensen.

Limnology and Oceanography, Vol. 22, No. 5, p 814-832, September 1977. 12 fig, 1 tab, 46 ref.

Descriptors: *Fjords, *Sulfur compounds, *Oxidation-reduction potential, *On-site tests, Reduction(Chemical), Limnology, Inorganic compounds, Metabolism, Degradation(Decomposition), Water quality, Sediments, Coasts, On-site investigations, Sampling, Analytical techniques, Chlorides, Anerobic conditions, Foreign research, Foreign countries, Distribution patterns, Dissolved oxygen, Chlorides.
Identifiers: *Denmark, Sulfur cycle.

The cyclic transformations of inorganic sulfur compounds in the sediments of a Danish Fjord were followed for 2 years. The in situ rate of sulfate reduction measured with a radio-tracer technique together with chemical determinations of various sulfur compounds were used to calculate a budget of the complete sulfur cycle. Sulfate reduction rates were high at the sediment surface (25-200 nmol SO2(2-)/cu cm/d), and there was still measurable activity at a depth of 1.5 m. Sulfate reduction also was compared with the benthic community metabolism measured as the oxygen uptake rate of the sediment. Sulfate reduction accounted for 53% of the total mineralization of organic matter in the sediment. Only 3% of the sulfide was derived from organic sulfur. Of all the sulfide produced, 10% was precipitated by metal ions within the anoxic sediment, while the rest was reoxidized at the surface. The results demonstrated the dynamic nature of the sulfur cycle, with turnover times for sulfate of 4-5 months and for free sulfide of 1-5 days. The calculations illustrated the dynamic nature of the sediment system and the danger of drawing conclusions from pool sizes to process rates. (Humphreys-ISWS)
W78-00538

THE FLAX POND ECOSYSTEM STUDY: EXCHANGES OF CARBON IN WATER BETWEEN A SALT MARSH AND LONG ISLAND SOUND,
Marine Biological Lab., Woods Hole, MA.
G. M. Woodwell, D. E. Whitney, C. A. S. Hall, and R. A. Houghton.
Limnology and Oceanography, Vol. 22, No. 5, p 833-838, September 1977. 2 fig, 2 tab, 22 ref. NSF AG-375.

Descriptors: *Salt marshes, *New York, *Ecosystems, *Carbon, Tidal marshes, Tidal waters, Sounds, Carbon dioxide, Analysis, Analytical techniques, Limnology, Organic matter, Salinity, Sampling, Organic compounds, Estuaries.
Identifiers: *Long Island Sound(NY), *Flax Pond(NY).

Flax Pond, a tidal marsh on the north shore of Long Island, New York, was used to examine the exchanges of carbon in its various forms between a salt marsh and the coastal waters. The marsh removed fine particulate carbon from the tidal water throughout the year; it tended to be a small source of C as total CO2 and dissolved organic carbon during summer, and a sink for both forms in winter. The net flux of total carbon over a year, measured as total CO2 and as particulate and dissolved organic C, was a small input into the marsh, estimated as about 51 g C/sq m. The data were consistent with others showing the marsh to be a net consumer of chlorophyll throughout the year and a strongly heterotrophic system in summer and do not support the conventional view of marshes as net sources of fixed carbon to coastal waters. (Humphreys-ISWS)
W78-00539

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 1. MASS TRANSFER PROPERTIES AND SILICA DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environnnement.
J-P. Vanderborght, R. Wollast, and G. Billen.
Limnology and Oceanography, Vol. 22, No. 5, p 787-793, September 1977. 8 fig, 14 ref.

Descriptors: *Diagenesis, *Sediments, *Mass transfer, *Mathematical models, *Sediment-water interfaces, Coasts, Interfaces, Profiles, Porosity, Oxidation-reduction potential, On-site investigations, Limnology, Kinetics, Model studies, Silica, Sulfates, Nitrates, Ammonia, Water analysis, Connate water, Foreign research, Foreign countries.
Identifiers: *Belgium, *North Sea, Two layer model.

The results of chemical analysis of the interstitial water of several samples of sediments from a large muddy zone along the Belgian North Sea coast were reported. When special care is taken to collect the cores without disturbing the water-sediment interface, the vertical concentration profiles display typical patterns that cannot be explained by constant diffusivity models and that suggest the existence of 2 distinct sedimentary layers with different mass transfer properties. A two-layer model was proposed to describe the vertical silica profiles. It assumes that the mass transfer coefficient in the first 3.5 cm of the sediment upper layer is 100 times higher than in the compacted lower layer. The large increase is due mainly to turbulent processes induced by the movement of the overlying water. From the model, the flux of dissolved silica across the water-sediment interface was calculated. The contribution of the upper layer represents 70% of the total flux of silica out of the sediments. As a consequence, the fluxes may be underestimated by a factor of 4 if the layer is discarded during sampling or handling of cores. (See also W78-00543) (Humphreys-ISWS)
W78-00542

KINETIC MODELS OF DIAGENESIS IN DISTURBED SEDIMENTS. PART 2. NITROGEN DIAGENESIS,
Brussels Univ. (Belgium). Lab. d'Environment.
J-P. Vanderborght, R. Wollast, and G. Billen.
Limnology and Oceanography, Vol. 22, No. 5, p 794-803, September 1977. 6 fig, 4 tab, 25 ref.

Descriptors: *Diagenesis, *Sediments, *Sediment-water interfaces, *Mathematical models, *Nitrogen, Coasts, Interfaces, Profiles, On-site investigations, Model studies, Equations, Limnology, Kinetics, Sulfates, Nitrates, Ammonia, Water analysis, Connate water, Foreign countries, Foreign research, Nitrification, Dentrification.
Identifiers: *Belgium, *North Sea, Two layer model.

A two-layer mass transfer model developed to describe the vertical silica profile in the sediments of a muddy zone of the North Sea along the Belgian coast was applied to the description of the microbiological processes involved in nitrogen diagenesis in the same sediments. Intense aerobic heterotrophic activity and nitrification were postulated in the upper layer. Dentrification and sulfate reduction were assumed to be preponderant in the lower layer. Vertical profiles of oxygen, sulfate, nitrate, and ammonium were calculated according to the model and adjusted to experimental profiles. The fluxes of nitrate and ammonium across the water-sediment interface and the rates of ammonification, nitrification, and denitrification in the 2 layers were calculated from the results of the models. As in the case of silica, the contribution of the upper layer is much more important than that of the underlying sediment. (See also W78-00542) (Humphreys-ISWS)
W78-00543

FERMENTATION AND ENZYMATIC SACCHARIFICATION OF CELLULOSE AND LIGNIN WASTE,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering; Rhode Island Univ. Kingston. Dept. of Food Science and Technology; and Rhode Island Univ., Kingston. Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W78-00554

THE DISTRIBUTION OF DIATOMS IN MISSISSIPPI SALT MARSHES,
Mississippi State Univ., Mississippi State. Dept. of Botany.
M. J. Sullivan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 814, Price codes: A04 in paper copy, A01 in microfiche. Mississippi State University, Water Resources Research Institute, Completion Report, October 1977. 68 p, 7 fig, 21 tab, 18 ref. OWRT A-099-MISS(1), 14-34-0001-7052.

Descriptors: *Diatoms, Algae, Marshes, *Mississippi, *Salt marshes, *Distribution, Biological communities, Regression analysis, Energy, Temperature, Salinity, Soil moisture.
Identifiers: Graveline Bay Marsh(Miss), Spermatophytes.

Edaphic diatoms were collected trimonthly from beneath 5 monospecific stands of spermatophytes of Graveline Bay Marsh, Mississippi, over a yearly cycle. The 5 spermatophytes included Distichlis spicata, Scirpus olneyi, Juncus roemerianus, Spartina laterniflora, and S. patens. Of the 119 diatom taxa encountered, only 7 were endemic to a single spermatophyte zone. The single most abundant and evenly distributed diatom was Navicula tripunctata, which accounted for ca. 1 of every 5 individuals counted during the study. Calculation of relative abundance and niche breadth values for the 26 most abundant taxa indicated little seasonality in their distributions. The majority of these 26 taxa were not evenly distributed amongst the 5 communities, and this produced statistical differences amongst the communities with regards to various parameters of community diversity (e.g. H', S, and R'). Structural differences between selected pairs of diatom communities were quantified using a selected similarity index (SIMI) and the values generated were exceedingly variable. A multiple regression analysis indicated that structural differences between edaphic diatom communities were related to differences in temperature, salinity, blue light energy, elevation, and soil moisture.
W78-00555

EFFECTS OF SLUDGE APPLICATIONS ON SOIL WATER AND VEGETATION IN A NORTHERN HARDWOOD FOREST IN NEW ENGLAND,
New Hampshire Univ., Durham. Water Resources Research Center.
M. T. Koterba, J. W. Hornbeck, and R. S. Pierce.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 768, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, Research Report No 15, June 1977. 23 p, 6 fig, 1 tab, 37 ref. OWRT A-039-NH(2). 14-31-0001-4029.

Descriptors: *Sludge disposal, *Forest soils, Natural resources, *Vegetation, Liquid wastes, Rates of application, Application methods, *Soil water, *Soil chemistry, Ions, Lysimeters, Streams, New England, Forests, *New Hampshire.
Identifiers: *Ionic concentrations.

Dewatered and limed sludge obtained from a primary treatment plant was spread at two rates, 25 and 125 wet t/ha, on sandy loam soils in a northern hardwood forest in N.H. Changes in soil water chemistry were assessed using water samples collected at 20 and 45 cm depths with suction lysimeters. Changes in the understory vegetation were monitored using species diversity and frequency of individual species while changes in the overstory were based on the basal area growth of trees

> 5 cm in diameter. The light application of 25 t/ha caused only minor changes in soil water chemistry, but the heavy application of 125 t/ha caused increases in most of the major ions in soil water. At 20 cm, mean Cl concentrations rose to a maximum of 27.5 mg/l from background values of < 0.4 mg/l. SO4 initially declined 1.0 mg/l below background concentrations averaging 5.0 mg/l, and then rose to a maximum of 13.5 mg/l. Ca, which averaged about 2.0 mg/l, before the heavy application, also rose to about 13.0 mg/l. Mg, Na, K, H, and NO3 showed maximum increases in concentration that averaged 2- to 3-fold greater than background values of < 0.5 mg/l. At 45 cm, the increases in ionic concentrations following the heavy application were less than one half the increase that occurred at 20 cm. The concentration of most ions returned to background values within one year after the sludge was applied. The background chemistry of soil water at 45 cm was similar to streamwater chemistry in the study area. Thus, changes that occurred in soil water chemistry at this depth after sludge applications may reflect potential impacts on streams.
W78-00567

HYDROLOGIC AND BIOLOGIC CHARACTERISTICS OF NATURAL CHANNELS IN COASTAL MARSH OF MISSISSIPPI,
University of Southern Mississippi, Hattiesburg. Dept. of Geology.
O. L. Paulson, Jr., G. F. Pessoney, P. K. Stocks, K. A. Grimes, and J. Hovanesian.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 813, Price codes: A03 in paper copy, A01 in microfiche. Mississippi State University Water Resources Research Institute, Completion Report, October 1977. 22 p, 3 fig, 7 tab, 2 ref.

Descriptors: *Water circulation, Biology, *Tidal effects, Seasonal, *Mississippi, *Monitoring, *Coastal marshes, Channels, Water quality, Biota, Salinity, Dissolved oxygen, Temperature, Nitrogen, Phosphorus, Bacteria, Coliforms, Sediments, Plankton, Sampling.

A study of the effects of tidal action on circulation, water quality and biota of natural channels in Gulf Coast marsh lands was conducted to serve as a basis for comparison with a previous study of man-made canals. Seasonal and tidal changes in velocity, salinity, dissolved oxygen, temperature, nitrogen, phosphorus, coliform bacteria, plankton, benthic organisms and sediments were monitored for one year. Fecal coliform were less than 100/100ml water for all but two samples, and dissolved oxygen averaged 7.9 ppm. Trawl samples contained representative fish of the area with highest numbers and diversity obtained when salinities were high. Plankton were representative of brackish environment with numbers being highest near bayou mouths adjacent to Mississippi Sound. Tidal flushing was adequate to maintain good water quality except at mid point of a flow-through channel. Circulation in a dead-end natural channel was significantly better than that previously observed on man-made canals.
W78-00568

STUDIES ON THE OIL POLLUTION OF SEDIMENTS IN THE SETO INLAND SEA,
Hiroshima Univ. (Japan). Dept. of Fisheries.
H. Yamada, and M. Kayama.
Bulletin of he Nansei Regional Fisheries Research Laboratory, Vol 9, p 19-31, 1976. 12 fig, 1 tab, 12 ref.

Descriptors: *Oil, *Oil pollution, *Organic compounds, *Lipids, *Path of pollutants, *Sediments, Sampling, Seas, Stagnant water, Oil industry, Water quality, Environmental effects, Analytical techniques.
Identifiers: Alkanes, Pristane, Squalene, *Seto Inland Sea(Japan).

A relationship between lipid content and ignition loss was recognized in the Seto Inland Sea. Lipids as well as the organic compounds were accumulated in the sediments of stagnant areas. The n-alkanes/pristane and squalene ratio explained the contribution of petroleum oil in sediments. Lipids extracted from mud at the northern part of Osaka Bay, Harima Nada, Kii Suido and the southern part of Beppu Bay contained a larger proportion of petroleum hydrocarbons than those obtained from other areas. The path of oil pollutants was traced using the ratio in the Seto Inland Sea. (Klein)
W78-00571

FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS AND ECOSYSTEMS.
For primary bibliographic entry see Field 5C.
W78-00572

OIL SPILLS IN THE ALASKAN COASTAL ZONE - THE STATISTICAL PICTURE,
Coast Guard, Washington, D.C.
J. R. Harrald, B. D. Boyd, and C. C. Bates.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 1-7, 1977. 8 tab, 12 ref.

Descriptors: *Data processing, *Data storage and retrieval, *Data collections, *Oil spills, *Oil pollution, *Alaska, Statistics, Oil industry, Disasters, Coasts, Organic compounds, Water pollution sources.
Identifiers: Pollution Incident Reporting System, *Crude oil.

A U.S. Coast Guard method for collecting data on oil spills, the 'Pollution Incident Reporting System,' was described. Data include: pollutant source; volume, location; type of material spilled; plus 9 other categories of information. The recent history of oil spills along the Alaskan coast and prediction of future trends due to the development of major oil fields were discussed. (See also W78-00572) (Katz)
W78-00573

HYDROCARBONS IN THE WATER COLUMN,
Alaska Univ., College. Inst. of Water Resources.
D. G. Shaw.
In: Fish and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 8-18, 1977. 4 fig, 2 tab, 52 ref.

Descriptors: *Oil pollution, *Oil-water interfaces, *Oily water, *Solubility, *Solutes, *Dispersion, *Saturation, *Water chemistry, *Molecular structure, *Colloids, *Particle size, *Particle shape, Water pollution sources.
Identifiers: *Tar, *Crude oil, Tar balls.

The molecular characteristics of the interaction of petroleum hydrocarbons and water was presented. The water solubility of various particle sizes, from individually solvated molecules to large tar balls, were examined. The common practice of using non-equilibrium, non-steady state systems in evaluating the effects of petroleum on marine biota was criticized. (See also W78-00572) (Katz)
W78-00574

DISPERSAL AND ALTERATION OF OIL DISCHARGED ON A WATER SURFACE,
Chevron Oil Field Research Co., La Habra, CA.
D. C. McAuliffe.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 19-35, 1977. 2 fig, 3 tab, 98 ref.

Descriptors: *Oil spills, *Oil pollution, Oil-water interfaces, *Oily water, *Dispersion, *Biodegradation, *Emulsions, *Solubility, Evaporation, *Oxidation, *Chemical degradations, Molecular structure, *Weathering, Chemical properties, Water pollution sources, Organic compounds.
Identifiers: *Chemical dispersants, *Crude oil.

The fate of oil discharged to a water surface was reviewed. The physical, chemical, and biological alterations it subsequently undergoes were discussed in reference to methods for minimizing the adverse environmental consequences. The use of chemical dispersants to produce oil-water emulsions, which dilute and degrade more rapidly than a slick, was presented as a promising method to lessen the effects of oil spills. (See also W78-00572) (Katz)
W78-00575

BIODEGRADATION OF AROMATIC PETROLEUM HYDROCARBONS,
Texas Univ. at Austin.
D. T. Gibson.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 36-46, 1977. 7 fig, 4 tab, 54 ref.

Descriptors: *Biodegradation, *Pseudomonas, *Aquatic bacteria, *Carbon cycle, *Photosynthesis, *Aromatic compounds, *Oxidation, *Molecular structure, *Oil spills, *Enzymes, *Sulfur compounds, *Sulfur, Bacteria, Organic compounds, Microorganisms, Chemical properties.
Identifiers: *Dihydrodiols, *Crude oil, Degradation pathways.

An overview of the degradation pathways of aromatic hydrocarbons by prokaryotic and eukaryotic organisms was presented. Table listing monocyclic and polycyclic aromatic compounds that are oxidized by bacteria and the specific organism responsible were provided. The paucity of information on the biodegradation of the aromatic hydrocarbons present in crude oil was also discussed. (See also W78-00572) (Katz)
W78-00576

BIOTRANSFORMATION OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS INDIGENOUS TO THE ARCTIC AND SUBARCTIC,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
D. C. Malins.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 47-59, 1977. 3 fig, 6 tab, 45 ref.

Descriptors: *Metabolism, *Enzymes, *Toxicity, *Invertebrates, *Biodegradation, *Aromatic compounds, *Plankton, *Fish physiology, *Oil spills, *Oil pollution, *Animal metabolism, Animal physiology, Biochemistry, Organic compounds, Radioactivity techniques.
Identifiers: *Carcinogens, *Mutagens, Tissue analysis, Bioaccumulation.

The metabolism of the aromatic hydrocarbon fraction of petroleum by marine organisms was evaluated. It was pointed out that studies on the effects of petroleum on marine organisms have centered on the parent hydrocarbons rather than the potentially toxic metabolites. The biochemical pathways used by various plankton, invertebrates and fish to metabolize aromatic hydrocarbons were discussed. Particular emphasis was directed toward metabolite alterations of enzyme systems, tissue locations of various metabolites, and possible mutagenic activity. (See also W78-00572) (Katz)
W78-00577

ACCUMULATION AND TURNOVER OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS,
Skidway Inst. of Oceanography, Savannah, GA.
R. F. Lee.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 60-70, 1977. 3 tab, 61 ref.

Descriptors: *Metabolism, *Oil pollution, Animal metabolism, *Zooplankton, *Crustaceans, *Mollusks, *Fish physiology, *Animal physiology, *Oil spills, *Aromatic compounds, *Bioindicators, Biochemistry, Organic compounds, Monitoring, Reviews.
Identifiers: Bioaccumulation, Tissue analysis, *Crude oil, Tar, Depuration.

This review deals with the uptake, storage and discharge of petroleum hydrocarbons by marine organisms under laboratory and field conditions. Organisms collected from oil spill and chronically polluted areas were analyzed. Special attention was directed toward the ability of animals to depurate their hydrocarbons accumulated after exposure to oil. Organisms studied were: benthic algae; zooplankton; benthic crustaceans; benthic worms; bivalves; and fish. Bivalves received emphasis because of the extensive amount of laboratory and field studies on their accumulation of petroleum. (See also W78-00572) (Katz)
W78-00578

FOOD CHAIN TRANSFER OF HYDROCARBONS,
Woods Hole Oceanographic Institution, MA.
J. M. Teal.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 71-77, 1977. 36 ref.

Descriptors: *Food webs, *Fish food organisms, *Chlorinated hydrocarbon pesticides, *Oil spills, *Oil pollution, *Absorption, *Fish physiology, *Food chains, *Animal metabolism, Water pollution effects, Path of pollutants, Metabolism, Ecosystems, Organic compounds.
Identifiers: *Food web transfer.

Routes for the uptake of petroleum hydrocarbons by aquatic organisms other than foodweb magnification were examined. The pathway emphasized was that of foodweb transfer. Methods of pollutant transport considered included: transport by migrating or surface-feeding fish; sinking of materials such as tar particles; and hydrocarbon concentration in fecal pellets. (See also W78-00572) (Katz)
W78-00579

ACCUMULATION OF NAPHTHALENES BY GRASS SHRIMP: EFFECTS ON RESPIRATION, HATCHING AND LARVAL GROWTH,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
H. E. Tatem.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 201-209, 1977. 4 fig, 25 ref.

Descriptors: *Shrimp, *Growth rates, *Growth stages, *Larvae, *Larval growth, *Oil pollution, *Oil spills, *Respiration, *Hatching, *Reproduction, *Animal growth, Aromatic compounds, Organic compounds, Water pollution effects.
Identifiers: *Palaemonetes, *Naphthalene, *Sublethal effects, Tissue analysis, Bioaccumulation, Depuration, No 2 fuel oil.

Estuarine grass shrimp, Palaemonetes pugio, were exposed in artificial seawater to petroleum hydrocarbons from a No. 2 fuel oil. Exposure water and organisms were sampled periodically for naphthalene concentrations. Naphthalene levels in the exposure solution decreased rapidly while concentrations in the shrimp tissue increased dramatically. After 6 hr, tissue levels of methylnaphthalene were 150 times greater than water levels. Depuration of hydrocarbons was rapid and began during the exposure period; however, complete depuration did not occur. Respiratory rates were transiently depressed following exposure. Naphthalenes were also demonstrated to suppress larval hatching success and larval growth. A single 72-hour exposure of gravid female shrimp to PH (1.44 ppm) had a detrimental effect on larval hatching. Control females released an average of 45 larvae compared to 9 larvae for exposed females. A concentration of 0.72 ppm PH did not have a significant effect on larval hatching. Grass shrimp larvae continuously exposed to PH (0.85-0.52 ppm) weighed significantly less than control animals after 12 days. Removal of larvae to clean seawater resulted in accelerated growth. Exposure of adult grass shrimp to sublethal levels of PH or naphthalenes initially resulted in increased activity and disoriented swimming patterns. Animals which survived exposures seemed to recover completely when placed in uncontaminated seawater. (See also W78-00572) (Katz)
W78-00593

BIOLOGICAL SURVEY OF INTERTIDAL AREAS IN THE STRAITS OF MAGELLEN IN JANUARY, 1975, FIVE MONTHS AFTER THE METULA OIL SPILL,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
D. Straughan.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems, D. A. Wolfe, Ed. Pergammon Press, p. 247-260, 1977. 2 fig, 7 tab, 23 ref.

Descriptors: *Oil, *Oil pollution, *Oil spills, *On-site data collections, *Mussels, *Mathematical studies, *Intertidal areas, *Sediments, *Mortality, *Beaches, *Biota, Plant populations, Animal populations, Organic compounds, Invertebrates.
Identifiers: *Crude oil, *Tissue analysis, Chocalate Mousse, Metula, Kuwait crude, Straits of Magellan.

Field sampling was conducted in areas in the Straits of Magellen that were oiled and unoiled by oil spilled from the tanker Metula in August 1974. Marsh plants had started to grow through oil in the oiled areas. High levels of petroleum hydrocarbons were recorded in mussels in the oiled areas. The presence of byssus threads alone suggested recent loss of mussels in part of the heavily oiled area. The Kuwait crude oil spilled in the Straits of Magellen is similar to that spilled from the Torrey Canyon. In both instances there was large scale mousse formation. It is suggested that it is this physical impact that is the most significant factor and not the cold water conditions. (See also W78-00572) (Katz)
W78-00598

STUDIES ON PETROLEUM BIODEGRADATION IN THE ARCTIC,
Louisville Univ., KY. Dept. of Biology.
R. M. Atlas.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 261-269, 1977. 1 fig, 6 tab, 6 ref.

Descriptors: *Biodegradation, Oil, *Oil pollution, *Oil spills, *Nitrogen, *Phosphorus, *Marine microorganisms, *Aromatic compounds, *Aquatic bacteria, *Marine bacteria, *Oxygen requirements, *Abiotic environment, *Microbial degradation, Organic compounds, *Arctic, Alaska, Cold regions.
Identifiers: *Crude oil, *Paraffins, Beaufort Sea, Chukchi.

Microorganisms capable of biodegrading petroleum were found to be widely distributed in the Beaufort and Chukchi Seas, but to constitute only a low percentage of the indigenous heterotrophic microbial populations. Concentration of hydrocarbon utilizing microorganisms were lower in ice than in water of sediment. Hydrocarbon biodegradation potential was also lower in ice than in water of sediments. Rates of biodegradation were found to be limited by temperature and concentrations of available nitrogen and phosphorus. Residual oil had similar percentages of hydrocarbon classes as fresh oil; biodegradation of all oil component classes, including paraffinic and aromatic fractions, apparently proceeded at similar rates. (See also W78-00572) (Katz)
W78-00599

ARCTIC HYDROCARBON BIODEGRADATION,
Alaska Univ., College.
S. D. Arhelger, B. R. Robertson, and D. K. Button.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 270-275, 1977. 2 fig, 4 tab, 16 ref.

Descriptors: *Oil, *Oil pollution, *Oil slicks, *Biodegradation, Aquatic populations, *Sea water, *Oxidation, *Microbial degradation, *Marine microorganisms, *Aquatic bacteria, *Carbon dioxide, *Metabolism, Population, Arctic, Alaska, Radioactivity techniques, Tracers, Arctic Ocean.
Identifiers: *Alkanes.

Supplemented sterile sea water was inoculated with small sample volumes of raw sea water and examined for oil related micorbial activity. A ubiquitous Alaskan water microbial population of 10 to the 3rd power to 10 to the 5th power/l was indicated. Population estimates were based on the smallest sample volume that, when diluted into a supplemental sea water medium, produced cultures that would generate colonies on agar plates, became turbid, formed ATP, or disrupted added oil slicks. (See also W78-00572) (Katz)
W78-00600

THE ACCUMULATION AND DEPURATION OF NO. 2 FUEL OIL BY THE SOFT SHELL CLAM, MYA ARENARIA L.,
Industrial Environmental Research Lab.-Cincinnati, Edison, NJ. Oil and Hazardous Materials Spills Branch.
D. Stainken.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 313-322, 1977. 5 fig, 2 tab, 29 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Clams, *Aromatic compounds, *Retention, *Commercial shellfish, *Winter, *Seasonal, *Solubility, *Emulsions, *Toxicity, *Animal physiology, Mass spectrophotometry, Organic compounds.
Identifiers: Mya, Bioaccumulation, Depuration, *Naphthalene.

Young soft shell clams were exposed to subacute concentrations of No. 2 fuel oil-in-water emulsions under simulated winter (4C) spill conditions. A pattern of accumulation and discharge of petroleum constituents, an experimental depuration time and a potential transport mechanism of aromatic compounds from the fuel oil to the clams were experimentally determined. Clams accumulated the greatest amount of hydrocarbons within one week after the initial exposure. The accumulated hydrocarbons decreased each week as the hydrocarbon content of the water decreased. The depuration period was determined when the clams were transferred to an uncontaminated system for 14 days subsequent to the 28 day oil exposure. Accumulated hydrocarbons were rapidly, although

incompletely discharged. (See also W78-00572) (Katz)
W78-00604

THE FATE OF PETROLEUM HYDROCARBONS FROM A NO. 2 FUEL OIL SPILL IN A SEMINATURAL ESTUARINE ENVIRONMENT,
Virginia Inst. of Marine Science, Gloucester Point.
R. H. Bieri, and V. C. Stamoudis.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 332-344, 1977. 2 fig, 4 tab, 24 ref.

Descriptors: *Oil, *Oil pollution, *Oil spills, *Clams, *Oysters, *Estuaries, *Estuarine environment, *Aromatic compounds, *Absorbtion, *Gas chromatography, Sediment-water interfaces, *Biodegradation, *Toxicity, *Mortality, *Animal physiology, *Animal metabolism, Organic compounds.
Identifiers: *Alkanes, Depuration, *Aliphatic compounds, Bioaccumulation.

Oysters, Crassostrea virginica, and clams, Mercenaria mercenaria, were exposed to surface spills of No. 2 fuel oil in an esturaine area under seminatural conditions. The results showed that accomodated petroleum hydrocarbons in water reach their maximum concentration a few hours after the spills and then disperse very rapidly. Most hydrocarbons were below detection 25 hours after the spills. In oysters, while substantial hydrocarbon concentrations were present within 6 hours after the spill, uptake continued in some cases past 100 hours for both branched aliphatic and aromatic hydrocarbons, and appeared to be related to molecular weight. Clams acquired hydrocarbons at much lower concentrations than oysters. (See also W78-00572) (Katz)
W78-00606

EVAPORATION AND SOLUTION OF C2 TO C10 HYDROCARBONS FROM CRUDE OILS ON THE SEA SURFACE,
Chevron Oil Field Research Co., La Habra, CA.
C. D. McAuliffe.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 363-372, 1977. 1 fig, 7 tab, 11 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Evaporation, Air-water interfaces, *Solubility, *Aqueous solutions, *Vapor pressure, *Aromatic compounds, *Dispersion, Organic compounds, Sea water, On-site investigation.
Identifiers: *Crude oil, *Oil slicks, *Alkanes, *C2-C10 hydrocarbons.

Evaporation and solution of C2 to C10 hydrocarbons were measured from four ocean spills of two crude oils. Loss rates for these light hydrocarbons were in accordance with their vapor pressures. Oil discharged on a water surface is a nonequilibrium condition with respect to evaporation and solution. Hydrocarbons should dissolve from an oil slick in amounts related to their mole fractions in oil, and inversely proportional to their molecular weights. This was not observed, indicating that dissolved hydrocarbons quickly evaporated from the near-surface waters. These studies indicate that solution of hydrocarbons into the water column from crude oil slicks, followed by evaporation, resulted in immeasurably low concentrations of dissolved C2 to C10 hydrocarbons 15 minutes after each spill. (See also W78-00572) (Katz)
W78-00608

INPUT OF LOW-MOLECULAR WEIGHT HYDROCARBONS FROM PETROLEUM OPERATIONS INTO THE GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Oceanography.
J. M. Brooks, B. B. Bernard, and W. M. Sackett.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 373-384, 1977. 8 fig, 5 tab, 19 ref.

Descriptors: Oil, *Oil pollution, *Methane, *Propane, *Gulf of Mexico, *Offshore platforms, *Drilling, *Aromatic compounds, *Primary productivity, *Brines, *Toxicity, Water pollution sources, Organic compounds, Gas chromatography.
Identifiers: *Ethane, *Butane, *Aliphatic compounds, C1-C14 Hydrocarbons.

Dissolved C1 to C14 hydrocarbon patterns measured during the last 6 years in the Gulf of Mexico indicate that underwater venting of waste gases and brine discharges, both associated with offshore platforms, are the major sources of non-methane light hydrocarbons to upper Gulf coastal waters. These sources are apparently responsible for the two orders of magnitude increase in Louisiana Shelf waters over open ocean levels of the light hydrocarbons. Analyses of the hydrocarbons composition of vented gases and brines and estimates of their annual discharge rates indicate that up to 450 metric tons of C5 to C10 hydrocarbons are being added to Louisiana Shelf waters each year. (See also W78-00572) (Katz)
W78-00610

THE STABILITY OF EMULSIFIED CRUDE OILS AS AFFECTED BY SUSPENDED PARTICLES,
Delaware Univ., Newark. Dept. of Civil Engineering.
C. P. Huang, and H. A. Elliott.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 413-420, 1977. 11 fig, 2 tab, 15 ref.

Descriptors: Oil, *Oil pollution, *Suspended solids, *Suspension, *Emulsions, *Oil spills, *Colloids, *Electrochemistry, *Electrical properties, Oil-water interfaces, Organic compounds, Aquatic habitats.
Identifiers: *Crude oil, *Charged particles, Nigerian crude oil, Venezuelan crude oil, Iranian crude oil.

Interaction between emulsified crude oil and naturally occurring suspended solids, such as oxides, hydroxides, carbonates, and clays can significantly affect emulsion stability, and thereby govern the distribution and the toxicity potential of oily pollutants in the aquatic environment. The stability of three crude oil emulsions, viz., Nigerian, Venezuelan and Iranian, was studied in response to various types and concentrations of suspended solids, viz., A12O3, Si02, and kaolinite. Interfacial reactions between emulsion and solid were influenced by the physical and chemical properties of both kinds of particles involved as well as the chemical characteristics of the aqueous phase. (See also W78-00572) (Katz)
W78-00614

CHEMICAL CARCINOGENS IN THE MARINE ENVIRONMENT BENZO(A)PYRENE IN ECONOMICALLY IMPORTANT BIVALVE MOLLUSKS FROM OREGON ESTUARIES,
Oregon State Univ., Corvallis. Dept. of General Science.
M. C. Mix, R. T. Riley, K. I. King, S. R. Trenholm, and R. L. Schaffer.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 421-431, 1977. 6 fig, 2 tab, 32 ref.

Descriptors: *Aromatic compounds, *Estuaries, *Estuarine environment, Commercial shellfish, *Mollusks, *Clams, *Mussels, *Oysters, Oil, *Oil pollution, *Oil spills, Organic compounds, *Oregon, Monitoring.
Identifiers: *Carcinogens, *Benzo(a)pyrene, Tissue analysis.

Levels of carciongenic polycyclic aromatic hydrocarbons present in bivalve mollusks from Oregon's estuaries were studied. Because of many unique features in their life history and biology, indigenous shellfish were found to be useful for monitoring the marine environment. Detectable levels of benzo(a)pyrene were found in commercially important shellfish from 38 of 44 sampling sites in five Oregon Bays. (See also W78-00572) (Katz)
W78-00615

DISTRIBUTION OF PETROLEUM HYDROCARBONS IN WESTERNPORT BAY (AUSTRALIA): RESULTS OF CHRONIC LOW LEVEL INPUTS,
Victoria Ministry for Conservation, Melbourne (Australia).
K. A. Burns, and J. L. Smith.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 442-453, 1977. 3 fig, 3 tab, 32 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Mussels, *Bioindicators, *Industrial wastes, *Toxicity, Coasts, *Sediments, *Aromatic compounds, Animal physiology, Organic compounds, Water pollution sources, Chemical analysis, *Australia.
Identifiers: Bioaccumulation, Tissue analysis, Westernport Bay(Australia).

A study of hydrocarbons in Westernport Bay was undertaken to assess the impact of the chronic low level input associated with man's use of the environment even in the absence of major oil spills. Aims of this project are (1) to measure amount of background hydrocarbon pollution associated with present land development, (2) to identify sources and levels of inputs, (3) to measure hydrocarbon accumulation from chronic input, (4) to gain a detailed picture of the partitioning of hydrocarbons in this environment which includes measurements of hydrocarbons in the water column, sediments and selected organism, and (5) to assess the impact of chronic petroleum discharge on the structure and productivity of the ecosystem. The mussel, Mytilus edulis, was the major indicator species used to establish problem areas and probable sources of petroleum input. (See also W78-00572) (Katz)
W78-00617

WATER QUALITY MODELING OF A HIGH MOUNTAIN STREAM,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
J. D. White, and J. A. Dracup.
Journal Water Pollution Control Federation, Vol. 49, No. 10, p 2179-2189, October 1977. 7 fig, 5 tab, 8 ref.

Descriptors: *Water quality, *Simulation analysis, *Streams, *Computer models, Dissolved oxygen, Dissolved solids, Nutrients, Reach(Streams), Mathematical models, Systems analysis.
Identifiers: Fecal coliforms, Rainstorms.

A water quality simulation model, DOSAG II, was chosen to simulate water quality parameters on a section of Middle Fork Bishop Creek between the elevations of 3,050 and 2,400 m (10,000 ft and 8,000 ft) above mean sea level. The computer model was calibrated for this stream and in general for other mountainous streams at similar elevations. The model predicted water quality conditions that should exist in the study area. A comparison with observed data indicated the existence of undefined non-point sources along the lower reaches of the stream. In particular, total dissolved solids and nutrient levels increased near a resort. Dissolved oxygen levels remained at or slightly above the saturation point. Fecal coliform concen-

trations were found to be related to the incidence of rainstorms in the study area. (Bell-Cornell)
W78-00623

A COMPUTER PROGRAM FOR MODELING OF WATER QUALITY PARAMETERS IN STEADY STATE MULTI-DIMENSIONAL NATURAL AQUATIC SYSTEMS, (SECOND EDITION),
Environmental Protection Agency, New York. Data Systems Branch.
S. C. Chapra, and G. A. Nossa.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 372, Price codes: A06 in paper copy, A01 in microfiche. Final Report, October 1974. 102 p, 2 tab, 15 fig, 12 ref.

Descriptors: *Water quality standards, *Mathematical models, *Computer models, *Computer programs, Simulation analysis, Kinetics, Biochemical oxygen demand, Dissolved oxygen, Nutrients, Equations.
Identifiers: *Natural aquatic systems.

HARO3 is a computer program which can be used to model the steady-state distribution of water quality variables for multi-dimensional bodies of water. The technique underlying the program is based on the conservation of mass and up to two variables reacting in a feed forward fashion with first order kinetics may be modeled. This program was developed for analysis of the Biochemical Oxygen Demand (BOD) - Dissolved Oxygen system, but with minor modifications the program can be used to model analogous variables such as chlorides, phosphates, coliform bacteria, etc. HARO3 has been compiled in three versions. The first version handles a system of up to 50 segments and is designated HAR50; similarly HAR100 and HAR200 handle a maximum of 100 and 200 segments correspondingly. The only difference between these versions is in the size of the arrays defined in the programs. (See also W78-00633) (Bell-Cornell)
W78-00632

SNSIM1/2 'A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,'
Environmental Protection Agency, New York. Data Systems Branch.
R. E. Brasier, S. C. Chapra, and G. A. Nossa.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 923, Price codes: A04 in paper copy, A01 in microfiche. Final Report, February 1975. 52 p, 5 fig, 2 tab, 9 ref, 2 appen.

Descriptors: *Computer programs, *Computer models, *Simulation analysis, *Streams, *Networks, *Water quality, Dissolved oxygen, Biochemical oxygen demand, Evaluation, Rivers, Tributaries, Environmental control, Effects, Reach(Streams), Kinetics, Equations, Mathematical models, Systems analysis.
Identifiers: *Streeter-Phelps equation, Prediction.

Described is the SNSIM computer program which can be used to formulate a steady-state, one-dimensional simulation model of a stream network. Based on an expanded form of the Streeter-Phelps equation, SNSIM is designed to evaluate and/or predict the dissolved oxygen (DO) and the carbonaceous and nitrogenous BOD profiles in a river or stream where the effects of dispersion can be assumed to be insignificant. The stream network consists of a river and its tributaries which are segmented into sections of constant hydrologic, physical, chemical and biological parameters. Loads may be applied pointwise at the ends of the section or as distributed sources along its length. As well, point sources of both BOD and DO deficit from minor tributaries can be input at the ends of a section and background loads of BOD and DO deficit can be introduced at the system's upstream ends. The expanded Streeter-Phelps equation is then applied to each section to determine the CBOD, NBOD and DO deficit response to the loadings. Mass balances are applied at the junction of sections. Provided herein is a description of the program as well as its input. (See also W78-00632) (Bell-Cornell)
W78-00633

TIME AND SPACE VARIATION IN THE SURFICIAL SEDIMENTS OF THE NEW YORK BIGHT APEX,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 2L.
W78-00684

QUALITY OF WATER DISCHARGED FROM THREE SMALL AGRONOMIC WATERSHEDS IN THE MAUMEE RIVER BASIN,
Ohio Agricultural Research and Development Center, Wooster. Dept. of Agronomy.
L. A. Jones, N. E. Smeck, and L. P. Wilding.
Journal of Environmental Quality, Vol. 6, No. 3, p 296-302, July-September 1977. 1 fig, 5 tab, 17 ref.

Descriptors: *Sediments, *Lake Erie, *Water pollution sources, *Water quality, *Agricultural runoff, *Soil analysis, Geology, Glacial drift, Analytical techniques, Sediment transport, Particle size, Water pollution, *Agricultural watersheds, Calcium, Magnesium, Sodium, Potassium, Soil chemistry, Lakes, Ohio.
Identifiers: *Sediment mineralogy, *Stream pollution, *Maumee River Basin(Ohio), Sediment particle size, Glacial till soils.

The investigation was aimed at evaluating the quality of water and the characteristics of sediments leaving 3 nearly level watersheds in the Lake Plain sector of the Maumee River Basin during a 32-month period as a function of soils comprising the watersheds. Each watershed consisted of a soil of major extent (Paulding, Hoytville, or Millgrove) developed from the 3 most extensive geologic deposits present in the basin: lacustrine, glacial till, and beach sand, respectively. The results indicated that water quality is a function of soil characteristics, discharge, and year. The fine-textured Paulding watershed yielded lower concentrations of calcium, magnesium, and bicarbonate ions than the other 2 watersheds, but higher concentrations of sodium, potassium, and phosphorus. High concentrations of the latter 3 elements were attributed to the presence of septic tank effluent in the drainage ditch sampled. The Paulding watershed also yielded the highest concentration of sediment, which implies that nearly level watersheds of the basin, particularly fine-textured watersheds, may represent significant contributors of sediment entering the Maumee River. Flocculation of clay minerals in the sediments during fluvial transport resulted in increasing particle size and changing mineralogy on moving downstream from headwater areas. (Henley-ISWS)
W78-00688

SOLUBLE AND SEDIMENT NITROGEN LOSSES AS RELATED TO LAND USE AND TYPE OF SOIL IN EASTERN CANADA,
Macdonald Coll., Ste Anne de Bellevue (Quebec). Dept. of Renewable Resources.
G. H. Neilsen, and A. F. MacKenzie.
Journal of Environmental Quality, Vol. 6, No. 3, p 318-321, July-September 1977. 2 fig, 4 tab, 25 ref.

Descriptors: *Agricultural runoff, *Nitrogen compounds, *Sediments, *Runoff, *Agricultural watersheds, Water quality, Leaching, Water pollution sources, Nitrates, Nutrients, Pollutants, Water analysis, Water chemistry, Nitrites, Nitrogen, Analytical techniques, Soil analysis, Water analysis, *Canada.
Identifiers: *Agricultural drainage, Discharge rates, Stream pollution.

In order to assess the amounts and types of nitrogen lost in agricultural drainage, 7 agricultural watersheds, with a range of land use patterns and types of soil in southwestern Quebec and southeastern Ontario, were selected, and measurements of discharge rates, soluble inorganic nitrogen, and sediment Kjeldahl nitrogen were made during 1974-75. Correlations of the losses with land use and kind of soil were used to identify critical watershed factors affecting nitrogen loss. Soluble inorganic N concentrations in streams did not exceed 3.5 micrograms/ml. No watershed lost more than 5 kg/ha soluble N, except for the watershed with the maximum corn acreage (33%), which lost 22.8 kg N/ha per year. The pronounced significance of spring melt runoff was demonstrated by the movement of from 56 to 100% of annual soluble N from the monitored watersheds during March, April, and May. Sediment was a major transporter of N in the area, moving from 22 to 67% of total watershed N. Watersheds with greater corn acreage and relatively impermeable soils lost more soluble N, while watersheds with more organic soils and greater cultivated area lost more sediment N. (Henley-ISWS)
W78-00689

THE VELUWE ARTIFICIAL RECHARGE PLAN WATER QUALITY ASPECTS,
Rijksinstituut voor Drinkwatervoorziening, The Hague (Netherlands).
For primary bibliographic entry see Field 5G.
W78-00690

DESIGN OF TREND MONITORING NETWORKS,
Washington Univ., Seattle. Center for Quantitative Science in Forestry, Fisheries, and Wildlife.
For primary bibliographic entry see Field 5A.
W78-00695

SOME EFFECTS OF DUSTFALL ON URBAN STORMWATER QUALITY,
Enviro-Measure, Inc., Knoxville, TN.
For primary bibliographic entry see Field 5A.
W78-00697

1975 ANNUAL REPORT.
National Oceanic and Atmospheric Administration, Oak Ridge, Air Resources Atmospheric Turbulence and Diffusion Laboratory, TN.
For primary bibliographic entry see Field 5A.
W78-00721

SUMMARY OF ACTIVITIES AND PLANS-FY 1976-1977,
National Oceanic and Atmospheric Administration, Oak Ridge, TN. Air Resources Atmospheric Turbulence and Diffusion Lab.
For primary bibliographic entry see Field 5A.
W78-00722

AQUATIC TRANSPORT OF HEAVY METALS IN THE URBAN ENVIRONMENT,
Rutgers Univ., New Brunswick, NJ. Dept. of Environmental Sciences.
W. G. Wilber, and J. V. Hunter.
Water Resources Bulletin, Vol 13, No 4, p 721-734, August 1977. 2 fig, 9 tab, 18 ref. OWRT A-050-NJ(1).

Descriptors: *Heavy metals, *Urban runoff, *Sediments, *New Jersey, On-site investigations, Data processing, Water pollution, Pollutants, Path of pollutants, Storm runoff, Precipitation(Atmospheric), Storm water, Chemical analysis, Rivers, Drainage, Urbanization.
Identifiers: *Lodi(NJ), *Saddle River(NJ).

A study was conducted for the past 2 years on a 4.6 mile stretch of the Saddle River near Lodi, New Jersey. The primary objectives of the study were twofold: initially, the amounts of various heavy metals being contributed to the Saddle River by stormwater runoff, rainfall, and individual tributaries, etc., were investigated to better delineate the distribution of various sources of heavy metals to the aquatic environment. Secondly, a series of benthal deposits from the Saddle River were analyzed to determine the fate of the metals once introduced into the receiving stream. A mass balance analysis of heavy metals in the Saddle River was performed to determine the amount of materials contributed from unrecorded sources. The results of the study seemed to demonstrate the importance of considering the potential scouring of river sediments as a secondary source of metals in determinations of this type. The distribution of metals in precipitation samples collected in the study was found to be similar to that in runoff, with lead and zinc predominating. Relative concentrations of metals in precipitation as compared to those of stormwater were relatively insignificant. Metal concentrations of bottom sediments were found to vary considerably from sample to sample. (Sims-ISWS)
W78-00742

ENVIRONMENTAL EFFECTS OF SEPTIC TANK SYSTEMS,
Robert S. Kerr Environmental Research Lab., Ada, OK.
For primary bibliographic entry see Field 5C.
W78-00751

NATIONWIDE EVALUATION OF COMBINED SEWER OVERFLOWS AND URBAN STORMWATER DISCHARGES. VOLUME I: EXECUTIVE SUMMARY,
American Public Works Association, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-00752

GROUND-WATER RESOURCES OF THE ALLUVIAL AQUIFERS IN NORTHEASTERN LARIMER COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-00811

DISTRIBUTION OF INJECTED WASTEWATER IN THE SALINE LAVA AQUIFER, WAILUKU-KAHULUI WASTEWATER TREATMENT FACILITY, KAHULUI, MAUI, HAWAII,
Geological Survey, Menlo Park, CA. Water Resources Div.; Geological Survey, Reston VA.; and Geological Survey, Tallahassee, FL. Water Resources Div.
W. L. Burnham, S. P. Larson, and H. H. Cooper, Jr.
Open-file report 77-469, June 1977. 58 p, 14 fig, 2 tab, 12 ref.

Descriptors: *Waste water disposal, *Injection wells, *Path of pollutants, *Aquifer characteristics, *Hawaii, Saline water systems, Groundwater movement.
Identifiers: *Saline lava aquifer, Maui(Hawaii).

Field studies and digital modeling of a lava rock aquifer system near Kahului, Maui, Hawaii, describe the distribution of planned injected wastewater from a secondary treatment facility. The aquifer contains water that is almost as saline as seawater. The saline water is below a seaward-discharging freshwater lens, and separated from it by a transition zone of varying salinity. Injection of wastewater at an average rate of 6.2 cubic feet per second is planned through wells open only to the aquifer deep within the saline water zone. The lava rock aquifer is overlain by a sequence of residual soil, clay, coral reef deposits, and marine sand that form a low-permeability caprock which semiconfines the lava rock aquifer. Under conditions measured and assumed without significant change. After reaching a new steady state, the wastewater will discharge into and through the caprock sequence within an area measuring approximately 1,000 feet inland, 1,000 feet laterally on either side of the injection site, and about 2,000 feet seaward. Little, if any, of the injected wastewater may be expected to reach the upper part of the caprock flow system landward of the treatment plant facility. (Woodard-USGS)
W78-00814

A TECHNIQUE FOR MEASURING INDUSTRIAL WASTE DISPERSION RESULTING FROM OCEAN DUMPING,
EG and G Environmental Consultants, Waltham, MA.
D. Frye, G. Williams, and A. Davison.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 33A-1 - 33A-5, 1977. 5 fig, 10 ref.

Descriptors: *Dispersion, *Industrial wastes, *Waste disposal, *Fluorescence, *Water pollution sources, Measurement, Environmental effects, Baseline studies, Fluroescent dye, Path of pollutants.
Identifiers: *Outer Continental Shelf, Ocean dumping.

A measurement technique for collecting detailed information on the dispersion of industrial wastes discharged at sea has been developed and utilized on two studies off the U.S. East Coast. This technique employs a towed hose array capable of drawing water continuously from four depths as a survey vessel moves through a waste plume. Inline instrumentation automatically records seawater pH and fluorescence, a measure of waste concentration when fluorescent dye has been used to tag the waste. Sampling ports in the hose array can be used to collect discrete seawater samples in cases where the waste has not been tagged with dye, or for additional chemical analyses. Basic and acid wastes have been studied using this technique for periods up to 12 hours after discharge. Comprehensive data on short-term oceanic dispersion have resulted. In the two studies both continuous waste concentration measurements and discrete sampling techniques were used. Well-defined waste plumes were observed with a highly variable nature immediately after dujp with a much more regular distribution observed after several hours. The waste was limited vertically by the presence of a thermocline at about the 20-meter depth. (See also W78-00827) (Sinha-OEIS)
W78-00832

EFFECTS OF PRODUCED WATERS ON THE MARINE ENVIRONMENT,
Shell Development Co., Houston, TX; and Exxon Production Research Co., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-00834

FATE OF PETROLEUM HYDROCARBONS IN MARINE ANIMALS,
Skidaway Inst. of Oceanography, Savannah, GA.
R. F. Lee.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 40C-1 - 40C-4, 1977. 2 fig, 29 ref.

Descriptors: *Water pollution, *Aromatic compounds, *Monitoring, *Aquatic animals, Oil pollution, Crabs, Worms, Fishes, Clams, Mussels.
Identifiers: *Outer Continental Shelf, *Petroleum hydrocarbons, Detoxification, Metabolic pathways.

The concentration of hydrocarbons in marine animals exposed to oil reflects the relative importance of uptake, metabolism, storage and discharge. Crabs, worms and fish have a detoxification system in the liver or intestinal tract which degrades aromatic hydrocarbons to hydroxylated derivatives. Compared with the parent hydrocarbon, hydroxylated derivatives are more water-soluble and are released by the animals. Thus metabolic pathways help to reduce the level of hydrocarbon in the animal. The process is sometimes referred to as a detoxification mechanisms. Third generation worms chronically exposed to oil are resistant to oil, presumably because they contain high levels of hydrocarbon degrading enzymes. Bivalves, including clams, oysters and mussels, do not possess this enzyme system and tend to accumulate hydrocarbons to a greater extent than other marine animals. Because of this fact it has been suggested that they can be used to monitor ocean waters for petroleum pollution. (See also W78-00827) (Sinha-OEIS)
W78-00835

WEATHERING OF SPILLED OIL AND METHODS OF ACCELERATING,
Chevron Oil Field Research Co., La Habra, CA.
C. D. McAuliffe.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 40D-1 - 40D-10, 1977. 1 fig, 5 tab, 90 ref.

Descriptors: *Oil spills, *Weathering, *Dispersion, *Water pollution, *Environmental effects, Evaporation, Sedimentation.
Identifiers: *Outer Continental Shelf, Chemical dispersion, Spreading, Depuration.

Oil spilled on water undergoes alteration by physical, chemical, and biological processes. Rapid physical processes include spreading, movement with winds and water currents, evaporation of volatile components, solution, water-in-oil emulsification, dispersion as small droplets into water, spray injection into the air, and sedimentation. As the oil spreads, less rapid biological and photochemical processes start. Low-molecular-weight hydrocarbons rapidly evaporate, and the very small amounts of these that dissolve quickly evaporate from near-surface waters. Chemical dispersants can be used to change an oil slick into a dilute oil-in-water emulsion. Dispersed oil does not travel as far as in a slick, and shorelines are less threatened. Weathering processes of dispersed oil are accelerated, oil toxicity is more quickly reduced, and most of the known adverse effects from oil spills are lessened or eliminated. This paper reviews the weathering and documented temporary effects of oil spills, and summarizes the advantages of chemically dispersing oil slicks. (See also W78-00827) (Sinha-OEIS)
W78-00836

PRACTICAL APPLICATIONS OF FLOATING BREAKWATERS FOR SMALL CRAFT HARBORS,
Alaska Div. of Water and Harbors, Junean.
For primary bibliographic entry see Field 8B.
W78-00855

SEA ICE THICKNESS PROFILING AND UNDER-ICE OIL ENTRAPMENT,
Cold Regions Research and Engineering Lab., Fairbanks, AK.
For primary bibliographic entry see Field 5G.
W78-00861

CHEMISTRY OF MARINE PETROLEUM SEEPS IN RELATION TO EXPLORATION AND POLLUTION,
I. R. Kaplan, and W. E. Reed.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 3 (of 4), p 425-434, OTC 2933, 1977. 6 fig, 6 tab, 53 ref.

Descriptors: *Seepage, *Oil pollution, *Water pollution sources, *Oil spills, *Resources development, *Weathering, Chemical analysis, Exploration, Baseline studies, Sediments, California.
Identifiers: *Outer Continental Shelf, Natural seepage, Hydrocarbons, Crude oil.

Natural oil seepage contributes approximately 10% of the annual input of petroleum hydrocarbons to the marine environment and half of that arises from the continental shelves of the circum-Pacific. Chemical properties of submarine petroleum seeps off the Southern California borderland have been studied in relation to crude oil produced in the same geographic area, the compositional changes due to weathering in the marine environment, and the hydrocarbon and trace-element compositions of the surrounding sea water and adjacent sediments. This investigation has been undertaken to determine whether the hydrocarbon compositions of sea water or surface sediments reflect the composition of nearby seepage and can be used to identify previously unknown petroleum sources to resolve problems of pollution and to aid in exploration. (Sinha-OEIS)
W78-00864

NATURAL OIL SEEP DETECTION IN MARINE ENVIRONMENTS,
J. A. Eyer, J. E. Foreman, and G. L. Raney.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 325-330, OTC 2765, 1977. 3 fig, 7 ref.

Descriptors: *Seepage, *Oil pollution, *Water quality control, *Water pollution sources, Monitoring.
Identifiers: *Outer continental shelf, Pollution detection, Natural seepage.

The objective of this project was to determine the feasibility of detecting natural hydrocarbon seeps in the marine environment. In hostile environments, such as the Bering Sea, Beaufort Sea, Baffin Bay, Gulf of Alaska, and the North American East Coast (offshore), areas containing seeps could be upgraded providing all other exploration criteria were met. The natural oil seep detection mission was flown by NASA on July 30, 1974. The second mission was flown on Nov. 22, 1974, over the same area in the Gulf of Mexico. A combination of electronic and photographic data gathering systems was used. In this particular case the occurrence of natural hydrocarbon seeps can be directly correlated to geologic parameters that have ben documented by seismic work and subsequent drilling. It is of interest to note that the seeps that were active prior to drilling are still active after drilling. This is probably because the reservoirs containing the hydrocarbons were not produced and subsurface pressures were not significantly lowered because of hydrocarbon production. LANDSAT and SKYLAB imagery was searched in an attempt to correlate the aircraft data with space acquired imagery but without success. (Sinha-OEIS)
W78-00865

MERCURIC CHLORIDE UPTAKE BY EGGS OF THE RICEFISH AND RESULTING TERATOGENIC EFFECTS,
South Dakota Univ. Vermillion. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-00885

PENTACHLOROPHENOL DISTRIBUTION IN A FRESH WATER ECOSYSTEM,
University of Southern Mississippi, Hattiesburg. Inst. of Environmental Science.
R. H. Pierce, Jr., C. R. Brent, H. P. Williams, and S. G. Reeves.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 2, p. 251-258, 1977. 2 tab, 26 ref.

Descriptors: Pesticides, *Pesticide residues, *Pesticide Kinetics, *Wood preservatives(Pesticides), *Industrial wastes, Industrial water, *Bottoms sediments, Bottom sampling, *Wood wastes, Water pollution sources, Fishkill, Benthic fauna, Fungicides.
Identifiers: Tissue analysis, Bioaccumulation, *Pentachlorophenol, Chlorinated compounds.

The effects of an industrial waste overflow into a small creek were examined. A nearby lake sustained a fishkill from the waste water, which contrained PCP. Seventeen months after the spill PCP was found to persist in leaf litter and bottom sediments (up to 1,200 ppb). This persistence provides a potential for continuous contamination of the water column and biological magnification via detritus- and benthic-feeding organisms. (Katz)
W78-00886

RESIDUES OF CHLORINATED HYDROCARBONS IN COD LIVERS FROM THE KIEL BIGHT IN RELATION TO SOME BIOLOGICAL PARAMETERS,
Kiel Univ. (West Germany). Inst. fuer Meereskunde.
For primary bibliographic entry see Field 5A.
W78-00891

ACCLIMATION OF FATHEAD MINNOWS AND LAKE TROUT TO RESIDUAL CHLORIDE AND BROMINE CHLORINE,
Grand Valley State Coll., Avendale, MI.
G. M. DeGraeve, and R. W. Ward.
Journal Water Pollution Control Federation, Vol 39, p 2172-2177, 1977. 3 tab, 17 ref.

Descriptors: *Minnows, *Chlorine, *Trout, *Bromine, *Halides, *Chlorination, *Toxicity, *Lake trout, Water quality, Laboratory tests, Resistance, Effluents, Mortality, Lethal limit, Wastes, Disinfection, Water treatment, Waste water treatment.
Identifiers: *Fathead minnow, Tolerance, *Chlorobrominated effluent.

Fathead minnows and lake trout with previous exposure (longer than 2 hours) to chlorinated or chlorobrominated effluent respectively were capable of tolerating high levels of TRC or TRBC (total residual chlorine; total residual bromine chlorine) for longer periods of time than fish that were not previously exposed to either halogen. For fathead minnows there was a linear relationship between duration of previous exposure and tolerance to residual halogen levels in excess of 96-hour TL50 values. The acclimation of fathead minnows to TRC was most apparent after 4 or more hours of exposure to low TRC concentrations. Even after long-term exposure to sublethal levels of TRC in effluent, fathead minnows were not able to survive high TRC concentrations. (Klein)
W78-00892

THE EFFECTS OF MINE ACID ON THE POND RIVER WATERSHED IN WESTERN KENTUCKY,
Western Kentucky Univ., Bowling Green.
For primary bibliographic entry see Field 5C.
W78-00894

ALDRIN AND DIELDRIN UPTAKE IN INSECTICIDE-RESISTANT AND SUSCEPTIBLE MOSQUITOFISH (GAMBUSIA AFFINIS),
Mississippi State Univ., Mississippi State. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W78-00896

THE BEHAVIOUR OF MERCURY IN THE SYSTEM WATER - FISH,
Technische Hochschule, Darmstadt (West Germany). Fachbereich fuer Anorganische Chemie und Kernchemie.
J. H. Kramer, and B. Neidhart.
Bulletin of Environmental Contamination and Toxicology, Vol. 14, No. 6, p 699-704, 1975. 3 fig, 1 tab, 7 ref.

Descriptors: *Mercury, *Tracers, *Radiochemical analysis, *Tagging, Path of pollutants, Metals, Toxicity, Analytical techniques, Organic compounds, Lipids, Lethal limit, Water pollution effects.
Identifiers: Bioaccumulation, *Methylmercury compounds, Organic mercury, Inorganic mercury, Poecilia reticulata, Guppies.

The direct take (Excluding the food chain) of different dissolved mercury compounds by female Poecilia reticulata was studied. Using radiochemical tracers the authors investigated: (1) accumulation rates as a function of the chemical form of the dissolved Hg compounds; (2) accumulation rates as a function of the Hg concentration in the water; and, (3) the release of incorporated Hg in deionized water as a function of the Hg compound and the incorporation time. It was proposed that, in the case of the complex compounds, the complexing groups may have a screening effect, so that adsorption at the surface of the cells is insignificant or non-existent. This was supported by the finding of a direct relationship between free Hg in the water and rate of accumulation. The release of inorganic Hg was found to be about 17 times as fast as the releadse of incorporated methyl-HgCl. (Katz)
W78-00898

EPIBENTHIC INVERTEBRATES OF CROTON BAY IN THE HUDSON RIVER,
Boyce Thompson Inst. For Plant Research, Inc., Yonkers, NY.
M. E. Crandall.
New York Fish and Game Journal, Vol. 24, No. 2, p 178-186, 1977. 3 fig, 3 tab, 7 ref.

Descriptors: *Invertebrates, *Benthic fauna, *Hudson River, *Estuarine environment, *On-site data collections, *Landfills, Research equipment, Animal groupings, Aquatic life, Benthos, Amphipoda, Diptera, Isopods, Gastropods, Mussels, Equipment, On-site-investigation, Methodology, New York.
Identifiers: *Mason traps, Decapods, Polychaetes, Barnacles, Croton Bay(Hudson River).

An 8-month survey of the epibenthic fauna of Croton Bay in the Hudson River (NY) was conducted. Modified Mason traps were efficient in sampling many highly mobile or sessile organisms that are difficult to capture with conventional gear. Organisms of at least 39 genera were taken including four amphipids, two isopods, two decapods, a complex of chironomids, three gastropods and several polychaetes. In addition, the setting patterns of the barnacle, Balanus improvisus, and the mussel, Congeria leucophaetea, are described. The benthic organisms collected from Croton Bay were representative of the fauna present in similar habitats of a large portion of the Tappan Zee and Haverstraw Bay which is typically estuarine. The results of this study indicate that there is little stress imposed of the epibenthic community by the Croton Point landfill. (Katz)
W78-00899

5C. Effects Of Pollution

THE FLAX POND ECOSYSTEM STUDY: EXCHANGES OF CARBON IN WATER BETWEEN .A SALT MARSH AND LONG ISLAND SOUND,
Marine Biological Lab., Woods Hole, MA.
For primary bibliographic entry see Field 5B.
W78-00539

THE DISTRIBUTION OF DIATOMS IN MISSISSIPPI SALT MARSHES,
Mississippi State Univ., Mississippi State. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W78-00555

STUDIES ON THE OIL POLLUTION OF SEDIMENTS IN THE SETO INLAND SEA,
Hiroshima Univ. (Japan). Dept. of Fisheries.
For primary bibliographic entry see Field 5B.
W78-00571

FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS AND ECOSYSTEMS.
Pergamon Press, 1977. 478 p, Proceedings of a Symposium, Nov 10-12, 1976, Seattle, Wash. Edited by D.A. Wolfe and others.

Descriptors: *Oil wastes, *Oil pollution, *Oil spills, *Conferences, Marine algae, Marine animals, *Marine biology, Marine fish, Marine plants, *Aromatic compounds, *Phenols, *Bioassay, *Sea water, *Toxicity, *Mortality, Aquatic environment, *Habitats, Water pollution effects, Water pollution sources, *Path of pollutants, Organic compounds, Chemical analysis, Analytical techniques.
Identifiers: *Crude oil, Tissue analysis, Bioaccumulation, Napthalene, Aliphatic compounds.

This volume presents most of the papers which were presented November 10-12, 1976 at an international symposium by the same title, held at the Olympic Hotel in Seattle, Washington. The Symposium consisted of three half-day plenary sessions of invited papers and three half days of concurrent sessions for contributed papers describing original research results. On the final afternoon, a Panel was convened to discuss future research priorities in this field. The Symposium was sponsored by the National Oceanic and Atmospheric Administration and the Environmental Protection Agency to provide a vehicle for documenting the current status of research on the fates and effects of petroleum in marine environments, and for identifying areas still in need of future research. (See W78-00573 thru W78-00617) (Katz)
W78-00572

OIL SPILLS IN THE ALASKAN COASTAL ZONE - THE STATISTICAL PICTURE,
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5B.
W78-00573

HYDROCARBONS IN THE WATER COLUMN,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5B.
W78-00574

DISPERSAL AND ALTERATION OF OIL DISCHARGED ON A WATER SURFACE,
Chevron Oil Field Research Co., La Habra, CA.
For primary bibliographic entry see Field 5B.
W78-00575

BIODEGRADATION OF AROMATIC PETROLEUM HYDROCARBONS,
Texas Univ. at Austin.
For primary bibliographic entry see Field 5B.
W78-00576

BIOTRANSFORMATION OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS INDIGENOUS TO THE ARCTIC AND SUBARCTIC,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
For primary bibliographic entry see Field 5B.
W78-00577

ACCUMULATION AND TURNOVER OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS,
Skidway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5B.
W78-00578

FOOD CHAIN TRANSFER OF HYDROCARBONS,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5B.
W78-00579

COMPARATIVE OIL TOXICITY AND COMPARATIVE ANIMAL SENSITIVITY,
National Marine Fisheries Service, Auke Bay, AL. Auke Bay Fisheries Lab.
For primary bibliographic entry see Field 5A.
W78-00580

RESPONSES TO SUBLETHAL LEVELS OF PETROLEUM HYDROCARBONS: ARE THEY SENSITIVE INDICATORS AND DO THEY CORRELATE WITH TISSUE CONCENTRATION,
Battelle Pacific Northwest Labs., Sequim, WA. Marine Research Lab.
For primary bibliographic entry see Field 5A.
W78-00581

THE EFFECTS OF PETROLEUM HYDROCARBON EXPOSURE ON THE STRUCTURE OF FISH TISSUES,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
For primary bibliographic entry see Field 5A.
W78-00582

THE EFFECTS OF PETROLEUM HYDROCARBONS ON MARINE POPULATIONS AND COMMUNITIES,
Massachusetts Univ., Gloucester. Marine Station.
A. D. Michael.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 129-137, 1977. 1 tab, 33 ref.

Descriptors: *Oil, *Oil pollution, *Oil spills, Population, Animal populations, Aquatic populations, *Fish populations, *Biological communities, *Benthic fauna, *Benthic flora, *Genetics, *Toxicity, *Mortality, *Plankton, *Invertebrates, Mammals, Water birds, Environmental effects, Water pollution effects, Reviews.

Literature on the effects of oil spills on plankton, invertebrates, fish, birds and mammals was summarized. Several recent studies on marine populations were discussed in order to illustrate the short-comings of many investigations. The need for more detailed analyses of how these populations are altered or eliminated by acute and chronic exposure to oil was emphasized. (See also W78-00572) (Katz)
W78-00583

EFFECTS OF CERTAIN PETROLEUM PRODUCTS ON REPRODUCTION AND GROWTH OF ZYGOTES AND JUVENILE STAGES OF THE ALGA FUCUS EDENTATUS DE LA PYL,
Environmental Research Lab., Narragansett, RI.
J. L. Steele.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 138-142, 1977. 3 tab, 12 ref.

Descriptors: Algae, Growth stages, *Growth rates, *Bioassay, *Reproduction, *Aquatic algae, *Intertidal areas, *Toxicity, *Juvenile growth stage, *Fertility, *Oil pollution, *Fertilization, Organic compounds, Water pollution effects.
Identifiers: *Crude oil, *Fucus, No 2 fuel oil, Jet fuel.

A method has been devised to utilize easily obtainable eggs of Fucus as a bioassay. The effects of various petroleum products on growth and early development of the zygote has been studies. A crude oil had much less effect on Fucus growth than did No. 2 fuel oil or two jet fuels. When exposuure occured immediately prior to and during release of gametes, no germination or growth occurred with any of the oil types, even at the lowest concentration used. (See also W78-00572) (Katz)
W78-00584

EFFECT OF CRUDE OIL ON TROUT REPRODUCTION,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
H. O. Hodgins, W. D. Gronlund, J. L. Mighell, J. W. Hawkes, and P. A. Robisch.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 143-150, 1977. 2 fig, 3 tab, 18 ref.

Descriptors: *Fertility, *Rainbow trout, *Reproduction, *Oil pollution, *Hatching, *Fish eggs, *Mortality, *Spawning, *Fish reproduction, *Fry, *Oil, Salmonids, Organic compounds, Path of pollutants, Fish diets.
Identifiers: *Crude oil.

Prudhoe Bay crude oil was incorporated into the diet (1 g oil/kg food) of adult rainbow trout during sexual maturation to assess the effects of long-term petroleum exposure on salmonid fish reproductive success. Parallel control fish received identical rations, except without added petroleum. When the fish reached maturity, six to seven months after initiation of petroleum exposure, a total of 31 test and 10 control crosses were made. Mean survival through hatching was 86% and 90% for test and control eggs, respectively; the difference was non-significant ($P = 0.10$). Test and control males were virtually identical in fertility. Mean survival from hatching to swim-up fry stage of development was 76% for test and 91% for control fish; again the difference was not significant ($P = 0.10$). In addition, no gross morphological or histological abnormalities were observed in offspring of petroleum-fed fish. The results of these studies were, therefore, that there was no significant impairment of reproductive success detected from this type of dietary exposure to petroleum. (See also W78-00572) (Katz)
W78-00585

THERMAL CONDUCTANCE OF IMMERSED PINNIPED AND SEA OTTER PELTS BEFORE AND AFTER OILING WITH PRUDHOE BAY CRUDE,
Scripps Institution of Oceanography, La Jolla, CA. Physiological Research Lab.
For primary bibliographic entry see Field 5A.
W78-00586

EFFECTS OF EXTERNAL APPLICATIONS OF FUEL OIL ON HATCHABILITY OF MALLARD EGGS,
Fish and Wildlife Service, Laurel, MD. Patuxent Wildlife Research Center.
P. H. Albers.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 158-163, 1977. 4 tab, 12 ref.

Descriptors: *Oil pollution, *Oil spills, *Toxicity, *Bird eggs, *Mortality, *Ducks(Wild), *Mallard duck, *Embryonic growth stage, *Incubation, *Hatching, *Biological membranes, *Growth rates, *Reproduction, Oil, Organic compounds, Growth stages.
Identifiers: *Crude oil.

An experiment was performed to determine the toxicity of oil to incubating eggs. Number 2 fuel oil, a mixture of 9 paraffin compounds, and propylene glycol were applied to the surface of artificially incubated mallard (Anas platyrhynchos) eggs. Embryonic mortality was significantly greater ($P <$ or equal to 8.01) in all oil treated groups and the paraffin mixture group than in the control group. Most of the post-hatching (4 weeks) weights of the ducklings in all treatment groups were not significantly different ($P > 0.01$) from the control. Thus, the transfer of even small quantities of oil to the egg surface is sufficient to reduce hatchability. (See also W78-00572) (Katz)
W78-00587

EFFECTS OF EXTERNAL APPLICATIONS OF NO. 2 FUEL OIL ON COMMON EIDER EGGS,
Fish and Wildlife Service, Laurel, MD. Patuxent Wildlife Research Center.
R. C. Szaro, and P. H. Albers.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 164-167, 1977. 4 tab, 13 ref.

Descriptors: *Mortality, *Embryonic growth stage, *Bird eggs, *Oil pollution, *Oil spills, *Common eider duck, *Hatching, *Fertility, *Toxicity, *Reproduction, Growth stages, Waterfowl, Ducks(Wild), Organic compounds.

Because eggs of marine birds may be exposed to oil adhering to the feathers of adult birds, a study was undertaken to determine the effects of oil contamination. Two hundred common eider eggs were divided into four experimental sets of 50 each. Two sets were treated with No. 2 fuel oil in amounts of 5 microliters to 20 microliters; a third with 20 microliters of propylene glycol, a neutral blocking agent. The fourth set served as a control. Hatching success was 96 percent for the eggs treated with 20 microliters propylene glycol, 96 percent for the controls and 92 percent for the eggs treated with 5 microliters oil hatched. Only 69 percent of the eggs treated with 20 microliters of oil survived - a significant reduction in hatchability ($P 0.05$). Mean Hatching weights for all sets were statistically equal. Thus, oil pollution may significantly increase embryonic mortality in marine birds. (See also W78-00572) (Katz)
W78-00588

THE EFFECT OF PETROLEUM HYDROCARBONS ON THE SURVIVAL AND LIFE HISTORY OF POLYCHAETOUS ANNELIDS,
California State Univ., Long Beach. Dept. of Biology.
R. S. Carr, and D. J. Reish.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 168-173, 1977. 5 tab, 11 ref.

Descriptors: *Bioassay, *Toxicity, *Mortality, *Reproduction, *Annelids, *Oil pollution, *Oil spills, Littoral, Solubility, *Aromatic compounds, *Life cycles, *Life history studies, Organic compounds.
Identifiers: *Polychaetes, *Crude oil, No 2 Fuel Oil, South Louisiana Crude oil.

The toxicity of seawater-soluble fractions of No. 2 fuel oil and South Louisiana crude oil to five species of polychaetous annelids was determined. The results of these 28-day bioassays indicate a wide variability in sensitivity among the species tested with the two oils. The water soluble fractions of No. 2 fuel oil were more toxic to all species tested than South Louisiana crude oil. The effects of petrochemicals on reproduction were measured for some species. Using the number of offspring produced as a measure of effect, a significant suppression in reproduction was noted at some concentrations of fuel oil. However, a reproductive stimulation was observed for one species exposed to South Louisiana crude oil. (See also W78-00572) (Katz)
W78-00589

CYTOLOGICAL DAMAGE IN MERCENARIA MERCENARIA EXPOSED TO PHENOL,
Delaware Univ., Newark.
C. R. Fries, and M. R. Tripp.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 174-181, 1977. 20 fig, 4 plates, 12 ref.

Descriptors: *Phenols, *Aromatic compounds, *Clams, *Cytological studies, *Animal metabolism, Animal physiology, *Biological membranes, *Electron microscopy, *Toxicity, *Mortality, Organic compounds, Animal pathology, *Clams, Molluscs.
Identifiers: Histology, *Phagocytes, Gills, Hemocytes.

Adult clams were exposed to various concentrations of phenol in artificial seawater for 24 hours. Control animals were placed in artificial seawater only. Gills, gut, digestive gland and blood cells (hemocytes) were damaged. Basophilic tissue staining was evident at the lower concentrations of phenol; moderate necrosis and sloughing of ciliated ephithelial layers were seen at higher concentrations. Blood sinuses were distended and contained precipitated hemolymph. Electron microscopy also showed damage to epithelial cells. Cell and nuclear membranes remained intact at low concentrations; intracellular organelles (lysomoes, mitochondria, etc.) were in various stages of disintegration. (See also W78-00572)
W78-00590

INTERACTIVE EFFECTS OF TEMPERATURE, SALINITY SHOCK AND CHRONIC EXPOSURE TO NO. 2 FUEL OIL ON SURVIVAL, DEVELOPMENT RATE AND RESPIRATION OF THE HORSESHOE CRAB, LIMULUS POLYPHEMUS,
Texas A and M Univ., College Station. Dept. of Biology.
R. B. Laughlin, Jr., and J. M. Neff.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 182-191, 1977. 4 fig, 2 tab, 17 ref.

Descriptors: *Crabs, Solubility, *Oil, *Water temperature, *Salinity, Larvae, *Larval growth stage, *Growth rates, Growth stages, *Respiration, *Animal metabolism, *Bioassay, *Toxicity, *Oil pollution, *Thermal stress, Osmosis, Organic compounds, Benthic fauna.
Identifiers: *Horseshoe crab, Limulus polyphemus, No 2 fuel oil, Water soluble fractions, Arachnids.

Eggs and the first three instars of the horseshoe crab were exposed to water-soluble fractions (WSF) of No. 2 fuel oil. Survival of larvae decreased with decreasing temperature and increasing WSF concentration. The significance of differences in growth and development rates were difficult to determine because of high variability in these traits. These appear to be the least sensitive indicators of petroleum hydrocarbon stress. The respiration rate of oil-exposed animals was significantly higher than that of controls at nearly all salinity/temperature combinations. The interaction of salinity and WSF exposure on respiratory rate was highly significant. The data suggest that the ability to adapt to new environmental conditions rather than maintenance of any give equilibrium metabolic state is an important parameter to consider when evaluating the impact of petroleum on estuarine organisms. (See also W78-00572) (Katz)
W78-00591

EFFECTS OF DISPERSED CRUDE OIL UPON THE RESPIRATORY METABOLISM OF AN ARCTIC MARINE AMPHIPOD, ONISMUS (BOEKISIMUS) AFFINIS,
Fisheries and Marine Service, Ste. Anne de Bellevue (Quebec). Arctic Biological Station.
J. A. Percy.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 192-200, 1977. 5 fig, 2 tab, 14 ref.

Descriptors: *Oil, *Oil pollution, *Oil spills, *Metabolism, *Animal metabolism, *Bioassay, *Animal physiology, *Respiration, *Mortality, *Toxicity, Organic compounds, Arctic, Marine animals, Crustacean, Lethal limit.
Identifiers: *Crude oil, *Onisimus, *Sublethal effects.

Short-term lethality is an unsuitable criterion for assessing the ecological effects of pollutants. A variety of sublethal physiological effects may impair an organism's ability to function normally and lead to a reduction or elimination of sensitive populations in a polluted area. The effects of exposure to sublethal concentrations of dispersed crude oils upon the respiratory metabolism of a marine amphipod have been examined. At low oil concentrations metabolism was significantly depressed but with increasing concentration a reversal of the response occurs. A possible explanation for this complex response was presented. The effects of other factors, such as oil type, presence of dispersants, nutritional state of the animals and weathering of the oil, upon the metabolic response were also considered. (See also W78-00572) (Katz)
W78-00592

ACCUMULATION OF NAPHTHALENES BY GRASS SHRIMP: EFFECTS ON RESPIRATION, HATCHING AND LARVAL GROWTH,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W78-00593

EFFECTS OF A SEAWATER-SOLUBLE FRACTION OF COOK INLET CRUDE OIL AND ITS MAJOR AROMATIC COMPONENTS ON LARVAL STAGES OF THE DUNGENESS CRAB, CANCER MAGISTER,
Oregon State Univ., Newport. Marine Science Center.
R. S. Caldwell, E. M. Caldarone, and M. H. Mallon.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 210-220, 1977. 2 fig, 6 tab, 13 ref.

Descriptors: *Oil, *Oil pollution, *Toxicity, *Mortality, *Aromatic compounds, *Crabs, *Larval growth stage, *Solubility, *Bioassay, *Hatching, *Biological membranes, Organic compounds, Water pollution effects.
Identifiers: *Crude oil, *Naphthalene, *Cancer, *Benzene, Water soluble fractions, Zoeae larvae.

Larval stages of the Dungeness crab were exposed continuously to dilutions of Cook Inlet crude oil water-soluble fraction (WSF) of seawater solutions of naphthalene or benzene for periods lasting up to 60 days. Effects on survival, duration of larval development and size were employed as indicators of toxic effects. The concentration of aromatic hydrocarbons in the WSF were inversely related to the degree of alkylation in each of the benzene and naphthalene families, but the acute toxicity of the 12 compounds was directly related to the degree of alkyl substitution. In addition, naphthalene and its derivatives were more toxic than benzene and its derivatives, but was less concentrated in the WSF. Because of these relationships, the individual aromatic compounds, con-

tributed approximately equally to the acute toxicity of the WSF. (See also W78-00572) (Katz)
W78-00594

MOLTING AND SURVIVAL OF KING CRAB (PARALITHODES CAMSCHATICA) AND COONSTRIP SHRIMP (PANDALUS HYPSINOTUS) LARVAE EXPOSED TO COOK INLET CRUDE OIL WATER-SOLUBLE FRACTIONS,
National Marine Fisheries Service, Auke Bay, AL. Auke Bay Fisheries Lab.
T. A. Mecklenburg, S. D. Rice, and J. F. Karinen.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 221-228, 1977. 2 fig, 2 tab, 25 ref.

Descriptors: Oil, *Oil pollution, *Bioassay, *Larval growth stage, Larvae, *Mortality, *Toxicity, *Shrimp, *Crabs, *Lethal limit, *Crustaceans, Commercial shellfish, Organic compounds, Alaska, Methodology.
Identifiers: *Crude oil, Pandalus, Paralithodes, *King Crab, Water soluble fraction.

Larvae of the coonstripe shrimp and king crab were exposed to solutions of the water-soluble fraction (WSF) of Cook Inlet crude oil in a series of bioassays on intermolt stages I and II and the molt period from stage I to stage II. Molting larvae were more sensitive than intermolt larvae to the WSF, and molting coonstripe shrimp larvae were more sensitive than molting king crab larvae. When molting larvae were exposed to high concentrations of the WSF for as little as 6 hr, molting success was reduced by 10-30% and some deaths occurred. When larvae were exposed to these high concentrations for 24 hr or longer, molting declined 90-100% and the larvae usually died. The lowest concentrations tested did not inhibit molting at any length of exposure, but many larvae died after molting. Median lethal concentrations (LC50's) based on 144 hr of observation for molting coonstripe shrimp and 120 hr for molting king crab were much lower than the 96-hr LC50's, showing that the standard 96-hr LC50 is not always sufficient for determining acute oil toxicity. (See also W78-00572) (Katz)
W78-00595

RESPONSE OF THE CLAM, MACOMA BALTHICA (LINNAEUS), EXPOSED TO PRUDHOE BAY CRUDE OIL AS UNMIXED OIL, WATER-SOLUBLE FRACTION, AND OIL-CONTAMINATED SEDIMENT IN THE LABORATORY,
National Marine Fisheries Service, Auke Bay, AL. Auke Bay Fisheries Lab.
T. L. Taylor, and J. F. Karinen.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p 229-237, 1977. 3 fig, 1 tab, 19 ref.

Descriptors: *Oil, *Oil pollution, Solubility, *Bottom sediments, *Toxicity, *Mortality, *Clams, *Animal behavior, *Predation, *Bioindicators, *Bioassay, Alaska, Organic compounds, Behavior, Water pollution effects.
Identifiers: *Crude oil, Oil slicks, *Macoma, *Naphthalene, Water soluble fraction.

This clam will likely be subjected to oil slicks layered on the mud and to water-soluble fractions (WSF) of crude oil or oil-contaminated sediment. Gentle settling of crude oil over clam beds had neglible effects on clams observed for 2 months. Water-soluble and oil-treated sediment (OTS) fractions of Prudhoe Bay crude oil inhibited burrowing and caused clams to move to the sediment surface. Although short-term exposures of clams to the WSF of crude oil and OTS caused few deaths, behavorial responses of clams to oil may be of great importance to their survival in the natural environment. (See also W78-00572) (Katz)
W78-00596

LONG TERM BIOLOGICAL EFFECTS OF BUNKER C OIL IN THE INTERTIDAL ZONE,
New Brunswick Univ., St. John. Dept. of Biology.
M. L. H. Thomas.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D. A. Wolfe, Ed., Pergammon Press, p. 238-245, 1977. 2 fig, 6 tab, 20 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Mortality, *Toxicity, *Biological communities, *Clams, *Animal metabolism, *Sediments, *Intertidal areas, Lagoons, *Aquatic algae, Metabolism, Organic compounds, Biota.
Identifiers: *Bunker C Oil, Fucus, Mya, Chedabucto Bay, Nova Scotia.

In February, 1970 a large spill of Bunker C oil occurred in Chedabucto Bay, Nova Scotia, Canada when the tanker 'Arrow' grounded. Oil from the tanker has persisted for over six years on rocks and in intertidal sediments on the shores of the bay. During this period mortalities of common species in all major communities on both exposed and sheltered shores have occurred. Delayed recolonization appears to be related to long term toxicity. Soft-shell clams in lagoonal sediments have shown persistent mortalities proportional to oil content of sediments. This pattern appears to be a result of direct toxicity, environmental change caused by oil and sub-lethal metabolic effects. (See also W78-00572) (Katz)
W78-00597

BIOLOGICAL SURVEY OF INTERTIDAL AREAS IN THE STRAITS OF MAGELLEN IN JANUARY, 1975, FIVE MONTHS AFTER THE METULA OIL SPILL,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
For primary bibliographic entry see Field 5B.
W78-00598

STUDIES ON PETROLEUM BIODEGRADATION IN THE ARCTIC,
Louisville Univ., KY. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-00599

ARCTIC HYDROCARBON BIODEGRADATION,
Alaska Univ., College.
For primary bibliographic entry see Field 5B.
W78-00600

BIOAVAILABILITY OF SEDIMENT-SORBED NAPHTHALENES TO THE SIPUNCULID WORM, PHASCOLOSOMA AGASSIZII,
Battelle Pacific Northwest Labs., Sequim, WA. Marine Research Labs.
For primary bibliographic entry see Field 5A.
W78-00601

FACTORS AFFECTING THE RETENTION OF A PETROLEUM HYDROCARBON BY MARINE PLANKTONIC COPEPODS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5A.
W78-00602

EFFECTS OF TEMPERATURE AND SALINITY OF NAPHTHALENES UPTAKE IN THE TEMPERATURE CLAM, RANGIA CUNEATA AND THE BOREAL CLAM, PROTOTACA STAMINEA,
Texas A and M Univ., College Station. Dept. of Biology.
K. W. Fucik, and J. M. Neff.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 305-312, 1977. 4 fig, 2 tab, 22 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Absorption, *Salinity, *Water temperature, *Animal metabolism, *Animal physiology, *Mortality, Seasonal, *Clams, *Mollusks, Saline water, Organic compounds.
Identifiers: *Crude oil, *Naphthalenes, Depuration, Rangia, Prototheca.

Both species were exposed to a 25% WSF (water soluble fraction) of Southern Louisiana crude oil for three days under varying temperature and salinity regimes. In three uptake experiments, the greatest naphthalenes concentrations were measured in those clams exposed at the lowest temperatures. Statistical analysis confirmed that naphthalenes uptake in the different temperature-salinity groups in each experiment was significantly different. Temperature was shown to have the greatest effect on this difference. Temperature and salinity had no effect on the release of naphthalenes in either R. cuneata of P. staminea. (See also W78-00572) (Katz)
W78-00603

THE ACCUMULATION AND DEPURATION OF NO. 2 FUEL OIL BY THE SOFT SHELL CLAM, MYA ARENARIA L.,
Industrial Environmental Research Lab.-Cincinnati, Edison, NJ. Oil and Hazardous Materials Spills Branch.
For primary bibliographic entry see Field 5B.
W78-00604

EFFECTS OF CHLORINATED BIPHENYLS AND PETROLEUM HYDROCARBONS ON THE ACTIVITY OF HEPATIC ARYL HYDROCARBOR HYDROXYLASE OF COHO SALMON (ONCORHYNCHUS KISUTCH) AND CHINOOK SALMON (O. TSHAWYTSCHA),
National Marine Fisheries Service, Seattle, WA. Northwest Fisheries Center.
E. H. Gruger, Jr., M. M. Wekell, and P. A. Robisch.
In: Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. D.A. Wolfe, Ed., Pergammon Press, p. 323-331, 1977. 4 tab, 31 ref.

Descriptors: Oil, *Oil pollution, *Oil spills, *Salmonids, *Polychlorinated biphenyls, *Enzymes, *Salmon, *Chinook salmon, *Animal metabolism, Animal physiology, *Aromatic compounds, Organic compounds.
Identifiers: *Coho salmon, *Aryl hydrocarbon hydroxylase, Microsomes, *Hepatic microsomes, *Hematology, Biotransformation.

Saltwater-adapted coho and chinook salmon were fed two mixtures of test compounds: one composed of chlorobiphenyls and the other of petroleum hydrocarbons. Induction of aryl hydrocarbon (benzo(a)pyrene) hydroxylase activity occurred in hepatic microsomes form coho salmon within the first two weeks of hydrocarbon exposure. This induction was potentiated by the presence of chlorobiphenyls; however, no effect on enzyme activity was found with chlorobiphenyls alone. The results indicate that chlorobiphenyls act synergistically with hydrocarbons to induce the enzyme system in coho salmon. In chinook salmon, the activity of aryl hydrocarbon hydroxylase in hepatic microsomes was depressed by the chlorobiphenyls and hydrocarbons, administered both separately and together. It was concluded that chlorobiphenyls in marine environments may alter the activity of hydroxylases regulating the accumulation and discharge of petroleum hydrocarbons in organisms. (See also W78-00572) (Katz)
W78-00605

THE FATE OF PETROLEUM HYDROCARBONS FROM A NO. 2 FUEL OIL SPILL IN A SEMINATURAL ESTUARINE ENVIRONMENT,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5B.
W78-00606

INTERLABORATORY CALIBRATION FOR THE ANALYSIS OF PETROLEUM LEVELS IN SEDIMENT,
National Bureau of Standards, Washington, DC. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W78-00607

EVAPORATION AND SOLUTION OF C2 TO C10 HYDROCARBONS FROM CRUDE OILS ON THE SEA SURFACE,
Chevron Oil Field Research Co., La Habra, CA.
For primary bibliographic entry see Field 5B.
W78-00608

DETERMINATION OF THE LEEWAY OF OIL SLICKS,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W78-00609

INPUT OF LOW-MOLECULAR WEIGHT HYDROCARBONS FROM PETROLEUM OPERATIONS INTO THE GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-00610

INTERTIDAL SEDIMENT HYDROCARBON LEVELS AT TWO SITES ON THE STRAIT OF JUAN DE FUCA,
National Marine Fisheries Service, Seattle, WA. Northwest Fisheries Center.
For primary bibliographic entry see Field 5A.
W78-00611

CHARACTERIZATION OF VOLATILE HYDROCARBONS IN FLOWING SEAWATER SUSPENSIONS OF NUMBER 2 FUEL OIL,
Battelle-Pacific Northwest Labs., Richland, WA.
For primary bibliographic entry see Field 5A.
W78-00612

SEDIMENT HYDROCARBONS AS ENVIRONMENTAL INDICATORS IN THE NORTHEAST GULF OF MEXICO,
Gulf Coast Research Lab., Ocean Springs, MS.
For primary bibliographic entry see Field 5A.
W78-00613

THE STABILITY OF EMULSIFIED CRUDE OILS AS AFFECTED BY SUSPENDED PARTICLES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-00614

CHEMICAL CARCINOGENS IN THE MARINE ENVIRONMENT BENZO(A)PYRENE IN ECONOMICALLY IMPORTANT BIVALVE MOLLUSKS FROM OREGON ESTUARIES,
Oregon State Univ., Corvallis. Dept. of General Science.
For primary bibliographic entry see Field 5B.
W78-00615

SEASONAL VARIATIONS OF HYDROCARBONS IN THE WATER COLUMN OF THE MAFLA LEASE AREA,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W78-00616

DISTRIBUTION OF PETROLEUM HYDROCARBONS IN WESTERNPORT BAY (AUSTRALIA): RESULTS OF CHRONIC LOW LEVEL INPUTS,
Victoria Ministry for Conservation, Melbourne (Australia).
For primary bibliographic entry see Field 5B.
W78-00617

ENVIRONMENTAL EFFECTS OF SEPTIC TANK SYSTEMS,
Robert S. Kerr Environmental Research Lab., Ada, OK.
M. R. Scalf, W. J. Dunlop, and J. F. Kreissl.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 095, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-600/2-77-096, August 1977. 35 p, 11 fig, 4 tab, 23 ref. 1BA609.

Descriptors: *Septic tanks, *Waste disposal, *Water pollution sources, Land use, Planning, Design, Construction, Soil types, Geology, Topography, Aquifer characteristics, Groundwater recharge, Carrying capacity, Groundwater movement.
Identifiers: Septic disposal.

Septic tank-soil absorption systems are the most widely used method of on-site domestic waste disposal with almost one-third of the United States population depending on such systems. In spite of the fact that the percentage of newly constructed homes using septic tanks is decreasing, the total number continues to increase. Properly designed, constructed, and operated septic tank systems have been demonstrated to be an efficient and economical alternative to public sewer systems, particularly in rural and sparsely developed suburban areas. They have also demonstrated the potential for contamination of ground and surface waters due to their widespread use in unsuitable situations. Zoning and land use planning for areas relying on septic tanks should be based on soil variability, geology, topography and aquifer characteristics. Assessment of the social and economic consequences of converting from individual units to sewered and central treatment facilities must consider loss of groundwater recharge. Additional research is needed regarding: (1) the movement and fate characteristics in the subsurface environment of septic tank pollutants, especially viruses and organics; (2) the density of septic tank systems that can be tolerated before pollution problems necessitate sewers or septic system modifications; and (3) the development of septic system modifications and alternative individual sewage disposal system. (Nessa-NC)
W78-00751

NATIONWIDE EVALUATION OF COMBINED SEWER OVERFLOWS AND URBAN STORMWATER DISCHARGES. VOLUME I: EXECUTIVE SUMMARY,
American Public Works Association, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-00752

OCEANS '77 CONFERENCE RECORD.
Institute of Electrical and Electronics Engineers, Inc., New York.; and Marine Technology Society, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00827

PALAU: NATIVE PARADISE OR PETROLEUM SUPERPORT,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
D. F. Soule.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 1977, Vol 1, p 5D-1-5D-6, 1977. 1 fig, 19 ref.

Descriptors: *Environmental effects, *Resources development, *Reefs, *Coral, *Baseline studies, Harbors, Oil pollution, Oil spills.
Identifiers: *Outer Continental Shelf, *Superports, *Palau, Trust Territory Deepwater ports.

The islands of Palau are part of the Trust Territory of the United States and are about 600 miles east of Mindanao and almost due south by some 1800 miles of the southern Honshu cities of Osaka and Nagoya. Transshipment of oil in smaller tankers to the shallower waters of Japan would require a deepwater port and tank storage areas, as well as low populations to minimize protest on possible pollution. Physically Palau has ideal deepwater port areas and sheltered lagoons or reefs that could be filled for storage tanks or refineries. Construction impacts of dredging would be severe; coral reefs are alive only at a thin surface layer and silting can destroy them, as was demonstrated in Kaneohe Bay in Hawaii. Since the currents and trade winds flow from NE to SW, turbidity plumes could affect the major, very productive part of the reef. (See also W78-00827) (Sinha-OEIS)
W78-00828

OCEAN DUMPING -- RESEARCH AND MONITORING OF OCEAN DISPOSAL EFFECTS,
National Oceanic and Atmospheric Administration, Rockville, MD.
P. M. Cohern.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 1, p 23B-1 - 23B-4, 1977. 11 ref.

Descriptors: *Waste disposal, *Environmental effects, *Water pollution effects, Monitoring, Baseline studies.
Identifiers: *Continental Shelf, *Ocean dumping, New York Bight, Dumpsites.

A relatively new program at the National Ocean survey, in the research and monitoring of ocean waste disposal effects, is discussed. The background leading to the structuring of this program is described, and an overview of what waste materials are deposited in ocean areas and where those areas are located is presented. Certain basic issues of ocean disposal are commended on and studies in one area are described in some detail. The present trend appears to favor use of deeper, off-the-shelf sites. There are arguments to be made for and against this. No one can say that use of off-the-shelf sites is always environmentally preferable. Disposal on the continental shelf in waters of 30-100 meters can impose severe environmental penalties, but impacts are usually confined to a discreet area and are relatively easier to monitor. In theory dumpsites should be selected either for containment or dispersal. Only where no dumping has occurred can descriptions or baselines of conditions be established beforehand. The deepwater dumpsite DWD-106, off the coast of Delaware is described in detail. (See also W78-00827) (Sinha-OEIS)
W78-00830

TECHNIQUES FOR MEASURING THE EFFECTS OF NUCLEAR POWER PLANTS ON LOCAL FISH,
Washington Univ., Seattle. Applied Physics Lab.
W. C. Acker.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 1, p 23C-1 - 23C-2, 1977. 5 fig.

Descriptors: *Environmental effects, *Acoustics, *Nuclear powerplants, *Resources development, *Water pollution effects, *Thermal pollution, Fish, Water quality.
Identifiers: *Outer Continental Shelf, Thermal plumes, Acoustic measurement.

The Applied Physics Laboratory and Fisheries Research Institute at the University of Washing-

ton have developed acoustic equipment and techniques that are now being used to help assess the effects of coastal power plants on fish. The technique consists of acoustic assessment of fish abundance with a portable, towed assessment system and simultaneous measurement of the temperature at several depths in and around the thermal plume. When the acoustic-temperature measurements are used in conjunction with an acoustically directed sample fishing program, data on species composition can also be obtained. These data can then be used to help predict the potential long-range impact of the power plant on the local fish stock. This paper describes the equipment and techniques developed for these measurements and discusses some of the results. (See also W78-00827) (Sinha-OEIS)
W78-00831

ENVIRONMENTAL ASPECTS OF DRILLING FLUID AND DRILL CUTTINGS DISPOSAL,
Exxon Co., Houston, TX.
R. P. Zingula.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 40A-1 - 40A-4, 1977. 1 tab, 12 ref.

Descriptors: *Toxicity, *Water pollution, *Environmental effects, *Resources development, Offshore platforms, Drilling fluids, Dispersion, Dilution.
Identifiers: *Outer Continental Shelf, Drilling cuttings, Drilling muds.

More than 21,000 wells have been drilled for hydrocarbons in the offshore United States since 1947, with no known permanent damage to the marine biota. A large number of reports and publications dealing with mud and cuttings discharged from offshore wells and closely related topics were studies. Except in rare and unusual circumstances, the discharge of drilling mud and cuttings from normal well drilling operations has not caused and will not cause serious environmental damage. There is no question that drilling mud, mud components and cuttings are acutely toxic to various organisms if the concentrations are great enough, as is adequately shown by the results from the vast number of static bioassays that have been conducted. There is also no question that dilution and dispersion lower concentrations such that the discharge will cause neither immediate nor long-term damage. Some of the studies and their results are discussed in this paper, and an abbreviated bibliography is included for reference. (See also W78-00827) (Sinha-OEIS)
W78-00833

EFFECTS OF PRODUCED WATERS ON THE MARINE ENVIRONMENT,
Shell Development Co., Houston, TX; and Exxon Production Research Co., Houston, TX.
F. T. Weiss, and C. B. Koons.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 40B-1 - 40B-10, 1977. 1 fig, 4 tab, 41 ref.

Descriptors: *Water pollution effects, *Environmental effects, *Metals, *Microbial degradation, Aromatic compounds, Oil pollution.
Identifiers: *Outer Continental Shelf, *Produced water, Hydrocarbons, Dilution, Biochemical uptake, Volatilization.

Detailed data on the composition of produced waters are now more completely available, especially for inorganic ions. A review of these data and their significance leads to the conclusion that toxic components are present in very low concentrations in produced waters if at all. Natural forces such as dilution, evaporation, photooxidation and biological reactions rapidly reduce the concentration of any hydrocarbon or organic toxic components in the produced waters to levels not harmful to the marine environment and biota. Inorganic components are reduced in toxicity by chelation and sedimentation processes. Field data show that low-level discharge of produced waters has little to no detrimental effects on the marine environment or biota. (See also W78-00827) (Sinha-OEIS)
W78-00834

FATE OF PETROLEUM HYDROCARBONS IN MARINE ANIMALS,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5B.
W78-00835

WEATHERING OF SPILLED OIL AND METHODS OF ACCELERATING,
Chevron Oil Field Research Co., La Habra, CA.
For primary bibliographic entry see Field 5B.
W78-00836

CEPEX HARDWARE: (NOW AND IN THE FUTURE),
Case Existological Labs. Ltd., Victoria (British Columbia).
J. N. Case.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2, p 44C-1 - 44C-4, 1977. 8 fig, 1 tab, 5 ref. Grant IDO73-09763-A02.

Descriptors: *Water pollution effects, *Ecosystems, *Environmental effects, Aquaculture, Resources development, Pollutants.
Identifiers: *Outer Continental Shelf, *Chronic exposure, Controlled Ecosystem Pollution Experiment, Controlled Experimental Ecosystems.

The Controlled Ecosystem Pollution Experiment (CEPEX) is a cooperative multi-disciplinary research effort designed to test the effects of chronic exposure to low levels of pollutants on pelagic marine organisms. The method adopted was to erect large test tubes in the sea. The best way to fill the enclosure was to 'capture' the natural environment and avoid filling by pumping. Techniques have now been developed to allow night captures which increase the versatility of the closed ecosystem. The experiments would basically attempt to: have replicable CEE's (Controlled Experimental Ecosystems) which are experimentally manipulative, be of sufficient size to encompass two or more trophic levels at their natural population levels for one life cycle of the highest trophic level, have hardware which would be of non-toxic materials and as transparent as possible. Each CEE consists of: a float supporting all other equipment from the surface, a plastic container which has a basic cylindrical shape with a connected cone at the bottom, shrouds and weights to support the container shape and resist currents, and a dacron cone to support the bottom of the plastic container. Meaningful work in the open ocean would require a CEE of approximately 100 meter depth to experiment in the euphotic zone. This leads to some rather exotic size bags if the proportions of either of the present systems are followed. If remote sensing of pelagic species was perfected, then perhaps aircraft-launched, automatically deployed CEE's could report over larger areas of the ocean continuously to detect changes in environmental quality and biomass quantity. (See also W78-00827) (Sinha-OEIS)
W78-00837

PHYSICAL FACTORS AFFECTING THE SITING OF DREDGED MATERIAL ISLANDS,
Texas A and M Univ., College Station. Dept. of Geology.
C. C. Mathewson, and R. M. McHam.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2 p Poster-G-1 - Poster G-6, 1977. 5 fig, 12 ref.

Descriptors: *Dredging, *Islands, *Environmental effects, *Resources development, Texas.
Identifiers: *Outer Continental Shelf, *Artificial islands, Siting, Coastal zone.

Dredge material islands are significant features formed very rapidly in comparison to normal geologic processes. A study of the affect of geologic processes on the redistribution of island sediment has identified ten physical factors that should be considered in selecting disposal sites in bays and lagoons. These factors include: wind; waves; tidal fluctuations, both astronomic and wind; currents, both fluvial and tidal; the physical characteristics of the dredge material; climate of the area; physiography of the basin; islands design, shape and height; affects of man, such as ship wake and land subsidence; and the biology of the site, both flora and fauna. These ten factors were found to interact in a complex manner that cannot easily be quantitatively evaluated. As-a-result, the physical environmental data needed for the selection of disposal sites or sites for island construction will remain a geological art rather than mathematical calculation. (See also W78-00827) (Sinha-OEIS)
W78-00838

HAWAII AND THE MANGANESE NODULE INDUSTRY,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
For primary bibliographic entry see Field 6G.
W78-00839

TRACE METAL CONTENT OF PLANKTON AND ZOOPLANKTON COLLECTED FROM THE NEW YORK BIGHT AND LONG ISLAND SOUND,
National Marine Fisheries Service, Milford, CT. Middle Atlantic Coastal Fisheries Center.
R. A. Greig, A. Adams, and D. R. Wenzloff.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 1, p 3-8, July 1977. 2 fig, 3 tab, 4 ref.

Descriptors: *Baseline studies, Water pollution effects, Plankton, Zooplankton, New York, Silver, Cadmium, Nickel, *Trace elements, *Metals.
Identifiers: Outer Continental Shelf, *Trace metals, *New York Bight, *Long Island Sound.

Various plankton were obtained from Long Island Sound and the New York Bight. The purpose of the study was to obtain baseline data on trace metal levels in zooplankton from these areas and possibly to determine any differences in metal levels related to geographical location of sampling. The levels of silver, cadmium, and nickel in plankton did not differ markedly for the various geographic locations from both the New York Bight and Long Island Sound collections. Silver levels ranged from 0.5-1.4 ppm in all samples, whereas cadmium levels were in the range of 0.5-2.4 ppm and nickel levels ranged from 0.9-4.6 ppm for all samples. The copper lead, and zinc levels in zooplankton varied greatly as a function of either species or geographic location; thus, interspecific differences could not be determined. Individuals of the same species of zooplankton were collected from different geographical locations and large variations in copper, lead, and zinc levels were observed. (Sinha-OEIS)
W78-00859

ENVIRONMENTAL CONDITIONS ON THE CONTINENTAL SHELF OFF WEST GREENLAND,
Danish Inst. of Applied Hydraulics, Copenhagen.
For primary bibliographic entry see Field 5G.
W78-00862

ALONG-SHORE COHERENCE OF WINDS ALONG THE NORTH ALASKAN COAST FOR OIL SPILL ANALYSIS,
Coast Guard Research and Development Center, Groton, CT.

G. L. Hufford, J. P. Welsh, I. M. Lissauer, and B. D. Thompson.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 3 (of 4), p 529-532, OTC 2947, 1977. 3 fig, 2 tab, 11 ref.

Descriptors: *Oil spills, *Alaska, *Forecasting, *Dispersion, Storms, Models.
Identifiers: *Outer Continental Shelf, *North Slope, Predictions, Wind fields.

Forecasting the movement and dispersal of spilled oil along the Alaskan North Slope coast requires the description of the wind field(s). From analysis of available data there appears to be three regimes: a western regime (represented by data from Barrow); a central regime (represented by Lonely and Oliktok Point); and an eastern regime (represented by Barter Island). These regimes must be taken into account in the prediction of oil spill movement during 'normal conditions.' During storm conditions (passage of low pressure systems) the entire coast appears to be regionally controlled rather than locally. An existing Coast Guard storm model can be used to predict coastal winds. (Sinha-OEIS)
W78-00863

OUTER CONTINENTAL SHELF DEVELOPMENT IN THE SANTA BARBARA CHANNEL: LACK OF DETECTABLE IMPACT ON FISHERIES,
F. J. Hester, and R. Evans.
In: Proceedings of 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 261-267, OTC 2756, 1977. 1 fig, 4 tab, 11 ref.

Descriptors: *Fisheries, *Resources development, *Environmental effects, *Oil spills, *Water pollution effects, California, Gases, Seepage, Shellfish.
Identifiers: *Outer continental shelf.

The sport and commercial fish catch in the Santa Barbara Channel over a 20 year period was examined in an attempt to detect possible changes in catch that might be associated with OSC activity in the area during that same period. Such changes were not found, indicating that the effects of OCS activities were non-existent, or minor compared to natural changes in the ocean climate or to fishing pressure on the resources themselves. (Sinha-OEIS)
W78-00867

ENVIRONMENTAL ASPECTS OF DRILLING MUDS AND CUTTINGS FROM OIL AND GAS EXTRACTION OPERATIONS IN OFFSHORE AND COASTAL WATERS,
Exxon Production Research Co., Houston, TX.
P. H. Monaghan, C. D. McAuliffe, and F. T. Weiss.
In: Proceedings of 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 251-260, OTC 2755, 1977. 1 fig, 7 tab, 15 ref.

Descriptors: *Environmental effects, *Water pollution effects, *Drilling fluids, *Mud, *Oil pollution, Bioassay, Gases, Coasts.
Identifiers: *Outer continental shelf.

Drilling mud and cuttings discharged from the more than 21,000 wells drilled offshore and in coastal waters of the United States have not caused detectable environmental damage either short-term or long-term. This is the conclusion from a study of reports of underwater observations during actual discharges of mud and cuttings, laboratory bioassay results for materials used in drilling muds, and actual well histories and laboratory results used in estimating the concentrations of mud components. The materials added in greatest amounts to drilling muds are barite (barium sulfate) and bentonite clays. Bioassay data indicate that these solid materials are nontoxic. Any acute toxicity for a typical mud should be due mainly to the dissolved ligno-sulfonate thinner. However, rapid dispersion and dilution quickly lower the concentrations (within a few minutes to an hour) below those found to be toxic in bioassay tests conducted for four days without provision for dispersion and dilution. Mud and cuttings discharges apparently have not caused long-lasting effects, as a wide variety of mobile and fixed organisms are found on and under oil producing platforms. In the Gulf of Mexico, 10- to 15-yr old cuttings are not longer distinguishable from the normal sediments. Studies in Timbalier Bay have documented no adverse effects on marine life or buildup of hydrocarbons metals. (Sinha-OEIS)
W78-00868

EFFECTS AND UPTAKE OF CHLORINATED NAPHTHALENES IN MARINE UNICELLULAR ALGAE,
Environmental Research Lab., Gulf Breeze, FL.
G. E. Walsh, K. A. Ainsworth, and L. Faas.
Bulletin of Environmental Contamination and Toxicology, Vol 8, no 3, p 297-302, September 1977. 2 tab, 15 ref.

Descriptors: *Water pollution effects, *Toxicity, *Food webs, Algae, Chlorine, Tophic level.
Identifiers: *Outer Continental Shelf, *Chlorinated naphthalenes.

Studies on effects and uptake of three commercial mixtures of chlorinated napthalenes in marine unicellular algae are described. A chlorinated naphthalene formulation that contained a mixture of mono- and dichloro isomers was more toxic to marine algae than were formulations of two-, tetra-, penta-, and hexchloro isomers. However, uptake was directly related to chlorine content. The penta and hexachloronaphthalenes are generally the most toxic to animals, and if algae were exposed to these compounds in nature, it is possible that they could serve as vehicles for transfer to aquatic animals. Transfer through food webs could begin with algae and result in effects at higher trophic levels. (Sinha-OEIS)
W78-00873

IMPAIRMENT OF ANTIPREDATOR BEHAVIOR IN PALAEMONETES PUGIO BY EXPOSURE TO SUBLETHAL DOSES OF PARATHION,
Environmental Research Lab., Gulf Breeze, FL.
J. A. Farr.
Transactions of the American Fisheries Society, Vol 106, No 3, p 287-290, 1977. 1 tab, 16 ref.

Descriptors: *Pesticide toxicity, *Shrimp, *Organophosphorous pesticides, *Killifishes, *Predation, *Competition, *Biological communities, *Behavior, *Fish behavior, Pesticides, Commercial shellfish, Insecticides.
Identifiers: *Parathion, Palaemonetes, Sublethal effects.

Grass shrimp when exposed to sublethal concentrations of methyl or ethyl parathion, become more susceptible to predation by gulf killifish. An increase in spontaneous activity renders them more easily detected by a predator and they fatigue more quickly when being pursued. Such changes in a multi-prey community could result in altered predator preferences and subsequently could change community structure and trophic relationships. (Katz)
W78-00874

IMPINGEMENT OF FISHES AT PEACH BOTTOM ATOMIC POWER STATION, PENNSYLVANIA,
Ichthyological Associates, Inc., Drumore, PA.
For primary bibliographic entry see Field 8I.
W78-00875

USE OF THE LESLIE MATRIX FOR ASSESSING ENVIRONMENTAL IMPACT WITH AN EXAMPLE FOR A FISH POPULATION,
Stone and Webster Engineering Corp., Boston, MA. Environmental Div.
For primary bibliographic entry see Field 8I.
W78-00876

PRIMARY AND SECONDARY EFFECTS OF STRESS IN FISH: SOME NEW DATA WITH A GENERAL REVIEW,
Fisheries and Marine Service, West Vancouver (British Columbia). Research and Resource Service Directorate.
M. M. Mazeaud, F. Mazeaud, and E. M. Donaldson.
Transactions of the American Fisheries Society, Vol 106, No 3, p 201-212, 1977. 9 fig, 1 tab, 78 ref.

Descriptors: *Metabolism, *Oxygen requirements, Fish physiology, *Chinook salmon, *Sockeye salmon, *Fish genetics, *Dehydration, Animal metabolism, Salmonids, Genetics, Resistance, Freshwater, Fish, Marine fish.
Identifiers: Handling stress, *Catacholamines, *Corticosteroids, *Endocrine system, *Osmoregulation, Primary stress effects, Secondary stress effects.

Handling in fish induces perturbations of various biological parameters which have been investigated or reviewed in an attempt to analyze and quantify the resulting stress. Endocrine changes, being early consequences of stress, are referred to as primary effects. Original data obtained on coho, sodkeye, and chinook salmon show that all types of stress result in an increase in circulating catacholamines, mainly adrenaline. In mature male coho salmon, struggling and hypoxia also resulted in an increase of plasmatic icorticosteroids. Secondary effects occur as a result of these endocrine changes. Metabolic disturbances include a pronounced increase in blood glucose, and either a decrease or an increase of plasmatic free fatty acid (FFA) according to the species. These metabolic disturbances brought about by stress of short duration are shown to be of relatively long duration. Recent advances in the understanding of osmoregulation processes show that the action of catacholamines on gill permeability may explain the stress-induced water imbibition of fish in fresh water and the dehydration of fish in seawater. Beyond some practical considerations, the results reported open up the possibility for genetic selection of varieties of high or low response to stress. (Katz)
W78-00877

TOXINS OF THE GONVAULAX SP. AND INFESTED BIVALVES IN OWASE BAY,
Rhode Island Univ., Kingston. Coll. of Pharmacy.
Y. Oshima, W. E. Fallon, Y. Shimizu, T. Noguchi, and Y. Hashimoto.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 42, No 8, p 851-856, 1976. 2 fig, 1 tab, 5 ref.

Descriptors: *Toxins, *Toxicity, *Algal toxins, *Clams, *Dinoflagellates, *Chromatography, Poisons, Chemical analysis, Mortality, Eutrophication, Public health, Phytoplankton, Molluscs, Commercial shellfish.
Identifiers: Gonovaulax, Soft shell clams, Saxitoxin.

Algal specimens, mussels and short-necked clams were collected during or immediately after the outbreak of Gonvaulax sp. at Owase Bay in 1975. Extraction and purification of the toxins were carried out according to the method used for the isolation of the toxins in softshell clams and cultured G. tamarensis. By a combination of Sephadex G-15, Bio-Gel P-2 and Bio-Rex 70 column chromatography, six toxins were isolated from each specimen. Of these, five were identified as saxitoxin, GTX1, GTX1', GTX2, and GTX3, respec-

tively, which were found in G. tamarensis. The major toxin JGX1 was found to be a new one. (Katz)
W78-00878

SALINITY ACCLIMATION IN THE SOFT-SHELL CLAM, MYA ARENARIA,
Maine State Dept. of Marine Resources, West Boothbay Harbor. Research Lab.
E. P. Creaser, and D. A. Clifford.
Fishery Bulletin, Vol 75, No 1, p 225-230, 1977. 2 fig, 2 tab, 21 ref.

Descriptors: *Temperature, *Salinity, *Saline water, *Salt tolerance, *Water temperature, *Thermal stress, *Clams, Commercial shellfish, Water properties, Water pollution, Sewage, Water chemistry, Mollusks, Clams.
Identifiers: *Depuration, Acclimation, Soft shell clams.

This investigation was undertaken to establish the relationship of temperature to acclimation time when Mya is immersed into dilutions of seawater. The results are applicable to many real situations where Mya are harvested from an area with one set of environmental conditions and subjected to acclimation and depuration in an area of another. It was discovered that acclimation to concentrations proceeded faster than adjustment to dilutions. Temperature was seen to be directly related to the rate of acclimation, that is, the lower the water temperature, the longer the acclimation period. (Katz)
W78-00879

CHRONIC TOXICITY OF GUTHION TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS RAFINESQUE),
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
I. R. Adelman, L. L. Smith, Jr., and G. D. Siesennop.
Bulletin of Environmental Contamination and Toxicology, Vol. 15, No. 6, p. 726-733, 1976. 5 tab, 11 ref.

Descriptors: *Minnows, *Insecticides, Toxicity, *Mortality, *Lethal limit, *Fecundity, *Fertility, *Life cycles, Water quality standards, Pesticides, Organic pesticides, Water pollution effects, Growth stages, Bioassay, Phosphothioate pesticides.
Identifiers: *Guthion, Pimephales, Fathead minnow.

Data on the chronic toxicity of an environmental contaminant, important for establishing water quality standards, are not known for the insecticide Guthion. Fathead minnows were exposed to various concentrations of Guthion over a complete life cycle, from egg through fry in the second generation, in order to determine a maximum acceptable toxicant concentration (MATC). The lowest concentration of Guthion that had an adverse effect was 0.51 micro g/l where fecundity was drastically reduced. Estimates of the MATC ranged from 0.51 to 1.8 micro g/l. (Katz)
W78-00880

THE MASS MORTALITY OF COMMON MURRES IN THE IRISH SEA IN 1969,
Aberdeen Univ. (Scotland). Dept. of Zoology.
W. R. P. Bourne.
Journal of Wildlife Management, Vol. 40, No. 4, p. 789-792, 1976. 34 ref.

Descriptors: *Mortality, *Pesticide residues, *Toxicity, *Viruses, Epidemics, Diseases, *Animal diseases, Heavy metals, Polychlorinated biphenyls, Pathology, Path of pollutants, Bird eggs, Birds, Chlorinated hydrocarbon pesticides.
Identifiers: Tissue analysis, Bioaccumulation, *Murre, Uria, *Irish Sea.

Information concerning several occurrences of mass mortalities of the common murre (Uria aalge) was summarized. Data were presented on tissue concentrations of heavy metals and pesticides in samples from both birds and eggs. The possibility that the epidemic-like deaths are due to a pathogenic organism rather than toxic chemicals was discussed. (Katz)
W78-00881

SIZE-RELATED FACTORS ASSOCIATED WITH DIELDRIN CONCENTRATIONS IN MUSCLE TISSUE OF CHANNEL CATFISH ICTALURUS PUNCTATUS,
Iowa Cooperative Fishery Research Unit, Ames.
R. V. Bulkley, R. L. Kellogg, and L. R. Shannon.
Transactions of the American Fisheries Society, Vol. 105, No. 2, p. 301-307, 1976. 5 fig, 2 tab, 21 ref.

Descriptors: *Dieldrin, *Insecticides, Pesticides, *Organic pesticides, *Chlorinated hydrocarbon pesticides, *Pesticide residues, Size, *Channel catfish, Pesticide kinetics, Growth rates, Growth stages, Age, Metabolism, Fish physiology, Environmental effects.
Identifiers: *Tissue analysis, *Bioaccumulation, *Metabolic rate.

Dieldrin concentrations in muscle tissue of channel catfish, Ictalurus punctatus, from the Des Moines River, Iowa were compared in relation to body total length, age, sex, and fat content. Data suggest that several interacting size-related factors determine the amount of dieldrin assumulated by channel catfish, and that size alone is not a good indicator of dieldrin content in muscle under similar exposure conditions. (Katz)
W78-00882

THE TOLERANCE OF WARM-WATER PRAWNS TO RECIRCULATED WATER,
Ministry of Agriculture, Fisheries and Food, Conway (Wales). Fisheries Experiment Station.
J. F. Wickins.
Aquaculture, Vol. 9, p. 19-37, 1976. 7 fig, 6 tab, 22 ref.

Descriptors: *Mortality, *Toxicity, *Lethal limit, *Ammonia compounds, *Nitrogen compounds, *Nutrient removal, *Growth rates, *Recirculated water, Hydrogen ion concentration, Nitrification, Nitrates, Nitrites, Phosphates, Continuous flow, Inhibitors, Water chemistry, Carbon dioxide, *Ammonia.
Identifiers: *Prawns, Penaeus, Macrobrachium.

Ten species of penaeid and one caridean prawn were exposed to ammonia (as ammonium chloride) and nitrite and nitrate (as sodium salts) in a series of acute and chronic toxicity tests. Approximate 48-h LC50's for seven penaeid species considered together were: 1.29 mg unionized NH3-N/l; 170 mg NO2-N/l; 3400 mg NO3-N/l. Five chronic toxicity tests with ammonia were made. Each test lasted 3 weeks and showed that a mean concentration of 0.45 mg NH3-N/l reduced the growth of 5 penaeid species by 50% of that of the controls. A 'Maximum acceptable Level' which reduced growth by 1-2% of that of the controls was estimated to be 0.10 mg NH3-N/l. The importance of inorganic carbon in sea water in relation to mortality of cultured prawns is discussed. Since most marine operators measure ammonia in terms of total ammonia nitrogen (NH4-N) the calculated amounts of NH4-N that correspond to 0.10 mg NH3-N/l ('the maximum acceptable level') in sea water over a range of pH, temperature and salinity are tabulated. (Katz)
W78-00883

EFFECTS OF BENZENE ON GROWTH, FAT CONTENT, AND CALORIC CONTENT OF STRIPED BASS, MORONE SAXATILIS,
National Marine Fisheries Services, Tiburon, CA. Tiburon Lab.
S. Korn, J. W. Struhsaker, and P. Benville.
Fishery Bulletin, Vol. 74, No. 3, p 694-698, 1976. 1 fig, 2 tab, 11 ref.

Descriptors: *Growth rates, *Aromatic compounds, *Striped bass, *Animal growth, *Toxicity, *Juvenile growth stage, Fish physiology, Metabolism, Water pollution effects, Oil pollution, Organic compounds, Oil spills.
Identifiers: Sublethal effects, Tissue analysis, *Benzene, Acclimation.

Experiments were conducted to determine what effects sublethal levels of benzene had on energy utilization by fish as measured by growth, fat content and caloric content. Wet weight, dry weight and fat content decreased with increasing benzene concentration. There was an apparent acclimation of the fish to benzene at the low level (3.5 micro l/l) by the end of the 4-wk exposure period. Although the fish may be able to adapt by metabolic detoxification and depuration of benzene and metabolites, after more prolonged periods the competitive effects on energy utilization may not only decrease growth by also increase mortality or reduce ability to withstand environmental stress. (Katz)
W78-00884

MERCURIC CHLORIDE UPTAKE BY EGGS OF THE RICEFISH AND RESULTING TERATOGENIC EFFECTS,
South Dakota Univ. Vermillion. Dept. of Biology.
J. F. Heisinger, and W. Green.
Bulletin of Environmental Contamination and Toxicology, Vol 14, No 6, p. 665-673, 1975. 4 fig, 2 tab, 25 ref.

Descriptors: *Mercury, *Toxicity, *Mortality, *Embryonic growth stages, *Fish eggs, *Inorganic compounds, *Lethal limit, Water pollution, Water pollution effects, Path of pollutants, Fish physiology, Metals, Bioassay, *Absorption.
Identifiers: Teratology, Bioaccumulation, Tissue analysis, Mercury compounds, *Mercuric chloride, *Ricefish, Oryzias, Biological concentration.

Eggs collected from adult Japanese medaka were incubated for 16 days in solutions containing 10, 15, 20 and 30 ppb mercury as mercuric chloride. The mean hatchability of control eggs was 46.7 percent. Experimental eggs incubated in 10 ppb and 15 ppb mercury had hatching percentages of 58.3 and 20.3, respectively. (Chi Square = 12.8, P .0005). None of the 20 ppb or 30, experimental eggs hatched. Hemorrhaging, blood vessel deterioration and loss of blood cells were observed in 79 percent of the 15 ppb experimental eggs and all the 20 and 30 ppb experimental eggs. Neigher the control nor the 10 ppb experimental eggs demonstrated any of these abnormalities. The LC100 for 384 hours was between 20 ppb and 30 ppb. The 10, 15, 20, and 30 ppb experimental eggs concentrated mercury directly from the incubating solution 1,600, 1,900, 2,700, and 1,900 times, respectively. The total concentration of mercury in these eggs after 16 consecutive days was 16,000, 29,000, 54,000, and 56,000 ppb respectively. (Katz)
W78-00885

PENTACHLOROPHENOL DISTRIBUTION IN A FRESH WATER ECOSYSTEM,
University of Southern Mississippi, Hattiesburg. Inst. of Environmental Science.
For primary bibliographic entry see Field 5B.
W78-00886

RESPONSES OF EMBRYONIC CYATHURA POLITA (STIMPSON) (ISOPODA: ANTHURIDEA) TO VARYING SALINITIES,
Citadel, Charleston, SC. Dept. of Biology.
B. J. Kelley, and W. D. Burbanck.
Chesapeake Science, Vol 17, No 3, p. 159-167, 1976. 4 fig, 5 tab, 26 ref.

Descriptors: *Embryonic growth stage, *Salinity, *Saline water, *Salt tolerance, *Osmosis, *Semipermeable membranes, *Juvenile growth stage, *Membranes, *Biological membranes, *Membrane processes, *Isopods, *Metabolism, Salts, Animal physiology, Life cycles.
Identifiers: Osmoregulation.

The salinity responses of the embryonic stages of the isopod Cyathura polita have been studied. The development of cleaving eggs and embryos from the two cell stage through juveniles leaving the marsupium was observed in salinities of 0, 0.5, 10, 20, 30 and 40%. The marsupial stages are the most salinity sensitive stages in the life cycle. Normal development can proceed in water with salinities in the interval between 0 and 30%. The vitelling and embryonic membranes osmoregulate, maintaining concentration differences in dilute and concentrated media. Membrane shedding is an osmotic process and is the developmental event most vulnerable to osmotic disruption. Fluids within the vitelline and embryonic membranes are favorable to water uptake in 0 to 20%, but not in 30 and 40%. After hatching, membrane-less juvenile are limited hyperosmotic regulators. The distribution of C. polita conforms to the salinity limitations of the marsupial stages. (Katz)
W78-00887

TOXICITY OF METHOXYCHLOR AND NALED TO SEVERAL LIFE STAGES OF LANDLOCKED ATLANTIC SALMON,
New York State Dept. of Environmental Conservation, Albany.
H. J. Dean, J. R. Colquhoun, and H. A. Simonin.
New York Fish and Game Journal, Vol 24, No 2, p. 144-153, 1977. 2 fig, 5 tab, 5 ref.

Descriptors: *Bioassay, *Toxicity, *Growth stages, *Pesticide toxicity, *Pesticide residues, Fry, *Pesticide kinetics, *Mortality, *Atlantic salmon, Salmon, Analytical techniques, Pesticides, Chlorinated hydrocarbon pesticides, Juvenile fish.
Identifiers: *LC50, *Naled, *Methoxychlor.

The toxicity of methoxychlor and naled was determined for several life stages of landlocked Atlantic Salmon. By static bioassay, it was found that for methoxychlor the 24-hour LC50 to feeding fry and yearlings was 92 and 75 micrograms per liter, respectively. For naled, the 24-hour LC50 to feeding fry and fingerlings was 165 micrograms per liter. Effects other than death were also noted. (Katz)
W78-00888

PHYSIOLOGIC AND ENVIRONMENTAL FACTORS INFLUENCING THE CALCIUM-TO-TISSUE RATIO IN POPULATIONS OF THREE SPECIES OF FRESHWATER PULMONATE SNAILS,
Oakland Univ., Rochester, MN. Dept. of Biological Sciences.
R. D. Hunter, and W. W. Lull.
Oecologia, Vol 29, p. 205-218, 1977. 3 fig, 4 tab, 37 ref.

Descriptors: *Calcium, *Chemical analysis, *Calcium carbonate, *Snails, *Population, *Animal physiology, Analytical techniques, Laboratory tests, Inorganic compounds, Aquatic animals, Mollusks, Growth stages, Genetics.
Identifiers: Tissue analysis, *Pulmonates, Shells, Physa gyrina, Physa integra, Helisoma anceps.

A study of three species of freshwater pulmonate snails was carried out from 1973 to 1976, primarily in Michigan. The ratio of whole animal calcium content to tissue dry weight (Ca:tissue ratio) changes with age, but these changes are largely restricted to early growth and do not significantly affect individuals over 40 mg total dry weight, regardless of species. Ca: tissue ratio of Physa gyrina did not vary greatly between populations and showed a narrow range over a wide range of environmental calcium concentrations. Shell mass in P. gyrine is therefore either physiologically regulated in all populations (at a species specific constant level) or interpopulation variation is minimized by moderatly high levels of gene flow between populations. There was no relationship between Ca:tissue ratio and environmental calcium for either Physa integra of Helisoma anceps over a wide range of snail and environmental calcium values. In both of the foregoing species, shell calcium content varied greatly between populations. This variation did not conform to any apparent geographic cline. (Katz)
W78-00889

A 96-HOUR BIOASSAY OF OTTER CREEK, OHIO,
Heidelberg Coll., Tiffin, Ohio.
For primary bibliographic entry see Field 5A.
W78-00890

ACCLIMATION OF FATHEAD MINNOWS AND LAKE TROUT TO RESIDUAL CHLORIDE AND BROMINE CHLORINE,
Grand Valley State Coll., Avendale, MI.
For primary bibliographic entry see Field 5B.
W78-00892

THE INFLUENCE OF DDT AND DDE ON THE EMBRYOGENESIS AND THE MORTALITY OF LARVAE OF COD (GADUS MORHUA L.),
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Inst. fuer Kuesten- und Binnenfischerei.
V. Dethlefsen.
Berichte der Deutschen Wissenschaftliche Kommissionfur Miercesforschung, Vol 25, p 115-148, 1976/1977. 24 fig, 6 tab, 102 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Fish eggs, *Toxicity, *Mortality, *Larvae, *DDT, *DDE, Growth stages, Life cycles, Metabolism, Absorption, Fish physiology, Environmental effects, Fish reproduction, Water quality, Resistance, Path of pollutants.
Identifiers: *Embryogenesis, *Cod, Gadus morhua.

Artificially fertilized eggs of cod were exposed to different concentrations of DDT and DDE in seawater. The percentages of malformed and dead embryos and malformed and dead larvae increased with increasing concentration of DDT, the lowest concentration of DDT still producing harmful effects was 0.025 ppm for embryos and 0.0095 ppm for larvae. Mortality showed three phases of pronounced susceptibility; epiboly, beginning of hatching and end of yolk sac phase. A shifting of the percentual hatching during the hatching period was mainly caused by larvae staying two to three days longer in their egg membranes than control embryos. Length of hatched larvae decreased with increasing concentrations of DDT. DDT proved to be more toxic than DDE; combinations of the two substances did not reveal synergistic effects. Present concentration of DDT in North Sea water was not considered likely to produce acute toxic effects to embryos and larvae of cod, but the ability of organisms to accumulate DDT from ambient water was thought to merit further investigation. (Klein)
W78-00893

THE EFFECTS OF MINE ACID ON THE POND RIVER WATERSHED IN WESTERN KENTUCKY,
Western Kentucky Univ., Bowling Green.
R. Dyer.
Water Resources Bulletin, Vol 13, No 5, p 1069-1074, 1977. 2 fig, 2 ref.

Descriptors: *Mine acids, *Acid mine water, *Sulfur compounds, *Mine wastes, *Coal mines, Water sheds(Basins), Runoff, Environmental effects, Mine drainage, Water pollution sources, Mine water, Ecosystems, Land reclamation, Trees, Kentucky, Wildlife, Migration.

The effects of H2S04 formed in unreclaimed coal mines were discussed. The acid was found to flow into lower swamp areas where it caused considerable damage to the ecosystem. The major effect was the mass destruction of thousands of trees and various other phreatophytic plants, resulting in wildlife migrating out of the affected areas. New methods of mine acid abatement were considered to make mass reclamation of the area more realistic now than in the past. (Klein)
W78-00894

FIELD-LABORATORY DETERMINED AVOIDANCES OF THE SPOTFIN SHINER AND THE BLUNTNOSE MINNOW TO CHLORINATED DISCHARGES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-00895

ALDRIN AND DIELDRIN UPTAKE IN INSECTICIDE-RESISTANT AND SUSCEPTIBLE MOSQUITOFISH (GAMBUSIA AFFINIS),
Mississippi State Univ., Mississippi State. Dept. of Zoology.
J. Watkins, and J. D. Yarbrough.
Bulletin of Environmental Contamination and Toxicology, Vol. 14, No. 6, p 731-737, 1975. 3 tab, 10 ref.

Descriptors: *Insecticides, *Aldrin, *Dieldrin, *Chlorinated hydrocarbon pesticides, *Pesticide residues, *Pesticide toxicity, *Tracers, *Marking techniques, *Tagging, *Biological membranes, *Permselective membranes, Lethal limit, Toxicity, Carbon radioisotopes, Populations, Membranes.
Identifiers: Tissue analysis, *Mosquitofish, Gambusia, Bioaccumulation.

Insecticide-resistant and susceptible mosquitofish were exposed to 14-C labeled aldrin and dieldrin for timed intervals. Whole body and tissue levels of the two organochlorine insecticides were compared between the two populations, as well as visible symptoms of poisoning. The fact that there was always a greater amount of the two insecticides in both whole body and tissues of S fish and R fish is suggestive of an effective insecticide barrier in R fish. However, this barrier can only be effectively demonstrated at high concentrations. The possibility of a greater turnover rate in R fish than in S fish cannot be ignored. However, the equal insecticide levels in R and S fish at the lower insecticide treatments seem to indicate equal turnover rates in both populations. This does not rule out the possibility that at higher insecticide treatments R fish may have eliminated the insecticides at a greater rate than S fish. (Katz)
W78-00896

TRACE METALS IN LIVER FROM BLUEFISH, TAUTOG AND TILEFISH IN RELATION TO BODY LENGTH,
Rhode Island Univ., Kingston. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-00897

THE BEHAVIOUR OF MERCURY IN THE SYSTEM WATER - FISH,
Technische Hochschule, Darmstadt (West Germany). Fachbereich fuer Anorganische Chemie und Kernchemie.
For primary bibliographic entry see Field 5B.
W78-00898

EPIBENTHIC INVERTEBRATES OF CROTON BAY IN THE HUDSON RIVER,
Boyce Thompson Inst. For Plant Research, Inc., Yonkers, NY.
For primary bibliographic entry see Field 5B.
W78-00899

TOXICITY OF WATER-SOLUBLE GASOLINE FRACTIONS TO FOURTH-INSTAR LARVAE OF THE MOSQUITO AEDES AEGYPTI L.,
Vermont Univ., Burlington. Dept. of Zoology.
W. O. Berry, and J. D. Brammer.
Environmental Pollution, Vol. 13, p. 229-234, 1977. 2 tab, 12 ref.

Descriptors: *Toxicity, *Gasoline, *Mosquitos, *Larvae, *Growth stages, *Larval growth, *Bioassay, *Aromatic compounds, Oil pollution, Fuels, Aquatic insects, Water pollution, Water pollution effects, Cuticle.
Identifiers: *LD50, *Benzene, *Toluene, *Xylene, Water soluble fraction.

The toxicity of water-soluble components of gasoline to laboratory-reared fourth-instar larvae of the mosquito, Aedes aegypti (L.) was investigated. A median lethal dose (LD50) and a non-lethal dose (NLD) were established for these larvae following a 24 h exposure to water-soluble fractions of benezene, toluene, and xylenes. Based on the actual amount of each component in solution, static toxicity bioassays showed that acute toxicity of these monoaromatics increased in the sequence benzene, toluene, Xylenes. However, toxicity increased in the sequence xylenes, benzene, toluene when results were examined with respect to the amount of aromatic added to water to produce the LD50. The importance of determining the concentrations of compounds dissolved in water when conducting any investigation of biological effects of water pollutants is stressed. Preliminary toxicity studies with other larval stages of A. aegupti indicate that water-soluble gasoline fractions are more toxic to the younger instars. Aquatic stages of the mosquito appeared to be exceptionally susceptible during moulting. This suggests that the cuticle serves as a barrier against entrance of water-soluble aromatics. (Katz)
W78-00900

5D. Waste Treatment Processes

VIBRATING SCREENS IN INDUSTRIAL WASTE WATER TREATMENT,
Link Belt Co., Colmar, PA.
W. P. Stilz.
In: Proceedings 10th Industrial Waste Conference, Purdue University, Lafayette, Indiana, Eng. Ext. Ser. No. 89, p. 381 - 390, May 1955. 4 fig.

Descriptors: *Screens, *Design criteria, *Food processing industry, *Hydraulic equipment, Industrial wastes, Pre-treatment(Water), *Waste water treatment.
Identifiers: Meatpacking wastes, Vibrating screens.

The functions, basic design criteria and advantages of the vibrating screen for use in industrial waste treatment are discussed. Vibrating screens normally operate at speeds of 1000- 20000 rpm in a motion of 1/32 in. to 1/8 in. Capacities on liquid type screens are based on percent open area of the cloth; normally type 304 stainless steel wire is used. Four typical examples of low cost installations in processing plants are presented; at the Rath Packing Company, Waterlook, Iowa vibrating screens are used to dewater 600 to 700 gpm of paunch manure; and to screen all wastewater from the plant processing floor, the solids being used as fertilizer. (Prodehl-EPA, Corvallis)
W78-00507

AN INDUSTRIAL WASTE GUIDE TO THE MEAT INDUSTRY.
American Meat Inst., Washington, DC. Committee on Meat Packing Plant Waste Disposal.
For primary bibliographic entry see Field 5B.
W78-00508

RENDERING PLANT WASTE TREATMENT STUDIES, II. PILOT PLANT INVESTIGATIONS,
North Carolina Univ. at Chapel Hill. School of Public Health.
M. L. Granstrom.
Sewage and Industrial Wastes, Vol. 24, No. 12, p. 1478-1488, December 1952. 8 fig, 2 tab, 1 ref.

Descriptors: *Waste water treatment, *Trickling filters, *Anaerobic digestion, *Chlorination, *Flocculation, *Food processing industry, Biochemical oxygen demand, Chemicals, Data collections, Air entrainment, Laboratory tests.
Identifiers: *Rendering wastes, Anaerobic fermentation.

Discussed are the findings of such rendering plant waste treatment processes chemical treatment using alum and chlorine with and without acid for pH control; air flocculation with and without alum; trickling filter pilot plant with recirculation, aeration, and effluent chlorination; anaerobic fermentation of the total waste; and sludge drying properties before and after observed digestion. All tests were performed on samples of the effluent from the grease removal tank. The experimental work using air flocculation with or without alum indicated some advantage to this treatment over straight settling. The waste is amenable to trickling filter treatment; a recirculation ratio of at least 2:1 shouid be maintained. There is essentially no stabilization in anaerobic fermentation, only coagulation, so, settling tank should be provided. Sludge can be handled with standard procedures and digestion is feasible. (Prodehl-EPA, Corvallis)
W78-00509

WASTES FROM SMALL POULTRY DRESSING ESTABLISHMENTS,
Center for Disease Control, Atlanta, GA.
For primary bibliographic entry see Field 5A.
W78-00510

TREATMENT OF WASTE FROM SMALL SLAUGHTERHOUSES,
Pennsylvania State Univ., University Park. Dept. of Sanitary Engineering.
R. R. Kountz.
In: Proceedings of the 9th Industrial Waste Conf., Purdue University, Lafayette, Indiana, Engr. Ext. Serv. No. 87, p 195-201, May 1954. 1 tab.

Descriptors: *Chemical precipitation, *Filtration, *Food processing industry, *Waste water treatment, Biochemical oxygen demand, Industrial wastes, Laboratory tests, Septic tanks.
Identifiers: *Meat packing wastes, Chemical treatment, Sand filtration.

When stream pollution must be abated cheaply and simply treatment of wastes from small slaughterhouses poses a special problem in contrast to the large complete meat plant. Research on this problem was done by the Pennsylvania State College of Engineering with assistance from the State Department of Health. Activated sludge and conventional trickling filter methods are uneconomical and unsatisfactory. When two sand filters were operated in series, waste was applied at a rate of 200,000 gallons per acre per day in four days at two-hour intervals and yielded a reduction of 95% BOD in the summertime and 85% in the wintertime. A single filter yields 85% and 60%, respectively. Septic tanks satisfactorily reduce the pollution load if a relatively large tank size can be justified. Hypochlorite-alum treatment of slaughterhouse waste will produce 95% or better reduction in BOD values of 1000-3000 ppm, but reduction drops off rapidly to 60 to 70% as the amount of process cooking in the plant increases. (Prodehl-EPA, Corvallis)
W78-00511

TANNERY WASTE MANAGEMENT,
Cincinnati Univ., Dept. of Environmental Engineering.
J. D. Eye.
Summary paper of presentation at the U.S. - Polish Waste Treatment R and D Seminar, Winter 1975. 20 p, 5 fig, 7 tab.

Descriptors: *Chromium, *Lagoons, *Tannery wastes, *Waste water treatment, Aerated lagoons, Anaerobic digestion, Aerobic treatment, Biochemical oxygen demand, Sulfides, Suspended solids, Waste identification.

Tanning of hides into leather creates a large volume of highly polluted wastes. Initially most of the pollutants are contained in relatively small volume highly concentrated waste fractions. Separation and pretreatment of waste fractions prior to blending for clarification and biological treatment appears to be the most efficient method for managing these wastes. Plant arrangement and discharge schedules often prevent effective separation of the waste fractions hence it may be necessary to treat the combined wastes as a single effluent. When separation and pretreatment are possible the usual procedure is to oxidize the sulfides with air using manganese as a catalyst and to precipitate chrome as chromium hydroxide. In some cases flue gas is used to lower the pH of the lime bearing wastes. The treatment of the combined waste streams usually includes screening, primary clarification with or without coagulants, aerobic biological treatment by activated sludge or aerated lagoons or a combination of aerated and non-aerated lagoons, final clarification, and disinfection if required. Treatment efficiencies for BOD and suspended solids removal often are well above 90 percent. Operational problems particularly those related to cold weather operation are discussed. (Prodehl-EPA, Corvallis)
W78-00512

RENDERING PLANT WASTE TREATMENT STUDIES,
North Carolina Univ. at Chapel Hill. School of Public Health.
For primary bibliographic entry see Field 5A.
W78-00513

SEWAGE EFFLUENT DISPOSAL THROUGH CROP IRRIGATION,
Wisconsin Univ., Madison. Dept. of Soils.
For primary bibliographic entry see Field 5E.
W78-00514

FERMENTATION AND ENZYMATIC SACCHARIFICATION OF CELLULOSE AND LIGNIN WASTE,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering; Rhode Island Univ. Kingston. Dept. of Food Science and Technology; and Rhode Island Univ., Kingston. Dept. of Microbiology.
S. M. Barnett, D. Aidala, C. W. Houston, and A. G. Rand, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 820, Price codes: A06 in paper copy, A01 in microfiche. Completion Report, September 19, 1977. 85 p, 28 fig, 91 ref. OWRT B-070-RI(1), 14-34-0001-6115.

Descriptors: Aeration, *Biodegradation, *Biological treatment, *Enzymes, Effluents, *Cellulose, *Lignin, Microorganisms, *Oxygenation, Pressure, Pollution abatement, Water pollution treatment, *Waste water treatment, *Fermentation, Foaming, Liquid wastes, Microbial degradation, Fungi.

Identifiers: *Trichoderma vinde, Coriolus versicolor, Phanerochaete chrysosporium.

This study is concerned with the effects of foaming and pure oxygen utilization upon growth and enzyme production of the organism T. viride QM9414 in a submerged fermentation solid cellulose; and the isolation of extracellular laccases from pure cultures of Coriolus versicolor and Phanerochaete chrysosporium. Pure oxygen flow rates are varied, and during growth and enzyme production data are compared to results obtained during air fermentation runs (with flow rates five times those of pure oxygen for comparison purposes and still to meet oxygen requirements of the organism for growth). At an initial cellulose concentration of 1.0% for all fermentation runs, aeration with pure oxygen resulted in an enhancing effect upon enzyme production rate (about 1.5-2 times as fast as with air). Better oxygen utilization was associated with the pure oxygen fermentations as indicated by slightly lower average DO levels. This was attributed to better oxygen mass transfer during the oxygen fermentations, which would favor protein synthesis. Foaming was a problem common to both air and oxygen systems, but more so to air runs, especially during the first 3-4 days. Enzyme was present in the foam, which would account in part for lower levels in solution. Cell autolysis, which favors good enzyme production, occurred at earlier times during the oxygen fermentations, which would also help to explain better enzyme production rates with pure oxygen. The phenomenon of catabolic repression, characteristic of both glucose and cellobiose, seemed to be evident especially during the earlier stages of both air control runs, which would have inhibited enzyme production during these times. The isolated laccase derived from the organisms degrade a purified lignin. The concentrated enzyme also showed substrate specificity for both guaiacol and hydroquinone and yielded a positive syringaldazine test.
W78-00554

DETOXIFICATION BY BARK FILTRATION OF SHOCK LOADS TO SECONDARY TREATMENT SYSTEMS,
Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.
G. R. Lightsey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 800, Price codes: A03 in paper copy, A01 in microfiche. Mississippi State University, Water Resources Research Institute, Completion Report, October 1977. 40 p, 9 fig, 16 tab, 27 ref. OWRT A-100-MISS(1), 14-34-0001-7052.

Descriptors: *Pulp wastes, Pulp and paper industry, *Waste water treatment, *Filtration, *Absorption, Biological treatment, Microorganisms, Microbiology.
Identifiers: Pine bark, Shock loads.

Pine bark, an abundant manufacturing residue, is examined for its effectiveness as an absorbent for leveling shock loads which can disrupt a pulp mill's wastewater treatment system. Two types of bark, aged (5-8 years old) and raw, were evaluated in batch tests as absorbents for shock loads. Three sizes of each bark were tested. Aged bark was considerably more effective than raw bark in both rate of absorption and amount of absorption of shock loads. Bark size affected the rate of absorption, but not the total amount of absorption at equilibrium. Microbial activity was observed in effluent containing shock loads that had been contacted with bark. Untreated shock loads prevented microorganisms from growing. It is estimated that an aged bark filter 6 feet deep and less than 1/3 acre in size would be sufficient to neutralize the shock loads from a typical pulp mill for one year.
W78-00556

DUAL MEDIA FILTRATION OF WASTE STABILIZATION POND EFFLUENT,
Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.
M. T. Bond.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 769, Price codes: A04 in paper copy, A01 in microfiche. Mississippi State University, Water Resources Research Institute, Completion Report, September 1977. 52 p, 22 fig, 5 tab, 16 ref, append. OWRT A-107-MISS(1), 14-34-0001-7052.

Descriptors: *Oxidation lagoons, Algae, *Filters, *Filtration, Effluents, *Waste water treatment, Suspended solids, Settling basins, Nitrogen, Phosphorus.
Identifiers: *Dual media filtration, Sand filters, Coal filters.

This laboratory study examined the possibility of using dual media filtration as a method to remove suspended solids from waste stabilization pond effluents. Three filters were used. Filter beds were constructed by placing a layer of coal on top of a layer of sand. A minimum amount of intermixing of the two materials occurred when the filters were backwashed. Filter sands having an effective grain size of 0.2, 0.4 and 0.6 mm were used to pack six-inch diameter plexiglas columns to a depth of 24 inches. All coal media had an effective size of 0.9 mm, a uniformity coefficient of 1.5, and an in-column depth of 6 inches. Filters were operated both with and without the addition of coal to the beds. Maximum removal of suspended solids was approximately 50% for the 0.2 mm effective grain size dual media filters. Filters could be operated for only 8 to 14 hours before clogging. Nitrogen and phosphorus removal by the filters was organically bound material, contained in the cells of algae, and other matter was retained in the media. Backwash requirements for cleaning the 0.2 mm sand were much less than for the coarse filters. Dual media filters were much easier to clean than sand filters.
W78-00557

ADVANTAGES AND DISADVANTAGES OF REGIONAL SEWERAGE SYSTEMS,
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W78-00562

BAYESIAN MODEL DISCRIMINATION FOR BOD ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-00620

HEURISTIC ALGORITHM FOR WASTEWATER PLANNING,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Science and Engineering.
C. H. Chiang, and D. T. Lauria.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 103, No. EE5, p 863-876, October 1977. 6 fig, 3 tab, 18 ref.

Descriptors: *Waste water treatment, *Pollution abatement, *Algorithms, Computer programs, Costs, Sanitary engineering, Optimization, Planning, Cost comparisons, Regions, Treatment facilities, Sewers, Pumping plants, Equations, Evaluation, Systems analysis.
Identifiers: *Heuristic methods, Systems engineering.

A heuristic algorithm has been developed for engineers and planners to make cost evaluations during regional wastewater planning in regard to the location, timing, and scale of treatment plants, sewers, and pumping stations. The algorithm is an iterative procedure which consists of both spatial and temporal cost comparisons in the search for optimality in wastewater planning. While spatial comparisons explore the possibility of combining two or more spatially distinct plants, temporal comparisons consider the possibility of combining two or more temporally distinct plants and transport lines. The algorithm yields quickly a sequence of good or perhaps least-cost solutions with modest machine and user requirements. (Bell-Cornell)
W78-00630

DISCUSSION 'REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,' BY R.E. MARKLAND, ET AL.,
Meta Systems, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5E.
W78-00644

LARGE WASTE TREATMENT SYSTEMS: DESIGN FOR BOTH EFFICIENCY AND INFLOW LEVEL OF EACH PROCESS,
McGill Univ., Montreal (Quebec). Dept. of Civil Engineering and Applied Mechanics.
D. Panagiotakopoulos.
In: Large Engineering Systems: Proceedings of the International Symposium, University of Manitoba, Winnipeg, Canada, Aug. 9-12, 1976. Alvin Wexler (Ed.), Pergamon Press, Inc., Oxford, United Kingdom, 1977, p 285-296. 5 fig, 17 ref.

Descriptors: *Waste water treatment, *Design, *Economic efficiency, *Liquid wastes, *Treatment facilities, *Networks, Optimization, Efficiencies, Algorithms, Equations, Analytical techniques, Inflow, Biochemical oxygen demand, Environmental control, Water quality control, Systems analysis, Dynamic programming.
Identifiers: *Cost minimization, Goal programming.

Waste treatment entails reduction of the loads which wastes exert on the environment and/or the balancing of these loads among receiving environmental media. Regarding liquid wastes, a waste treatment system might be a specific unit operation within a treatment plant, the whole treatment plant, or a group of plants along a stream. In designing a waste treatment system, the essential measures of system effectiveness refer to the inflow capacity, the operation efficiency, the outflowing waste load, and the cost. The design problem is to select the system operating conditions in terms of waste load reduction and the inflow level that minimizes cost and keeps outflowing wastes within specified limits. In the case of a plant, the above dual selection refers to each and every process. Although the cost of a treatment system is a function of both efficiency and inflow level, existing analytical tools ignore inflow level as a design variable. As is typical of several large systems, capability of the analytical tool and/or availability of relevant data have limited system analysis. Herein, a detailed statement of the general waste treatment system design problem is presented in analytical terms. Simplifications and limitations of existing solution methods are discussed. Suggested is an efficient network model through which the system can be optimized for both inflow and efficiency of each component process. This new model can consider the design of a wholly new system or an expansion of an existing system. Each arc of the network model corresponds to a unit process. The optimization algorithm developed is especially efficient for large networks. (Bell-Cornell)
W78-00647

LEGAL CRITICAL FACTOR ANALYSIS (IN COMPLIANCE WITH THE AREA-WIDE WASTE TREATMENT MANAGEMENT PLANNING PROGRAM).
Miami Valley Regional Planning Commission, Dayton, OH.

For primary bibliographic entry see Field 5G.
W78-00651

ENVIRONMENTAL EFFECTS OF SEPTIC TANK SYSTEMS,
Robert S. Kerr Environmental Research Lab., Ada, OK.
For primary bibliographic entry see Field 5C.
W78-00751

NATIONWIDE EVALUATION OF COMBINED SEWER OVERFLOWS AND URBAN STORMWATER DISCHARGES. VOLUME I: EXECUTIVE SUMMARY,
American Public Works Association, Chicago, IL.
R. H. Sullivan, M. J. Manning, J. P. Heaney, W. C. Huber, and M. A. Medina, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 133, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-600/2-77-064a, September 1977, 95 p. 13 fig, 31 tab. 68-03-0283.

Descriptors: *Storm runoff, *Cities, *Urban drainage, *Water pollution sources, *Urban runoff, *Water pollution control, Combined sewers, Separated sewers, Environmental effects, Simulation analysis, Treatment, Secondary treatment, Waste water treatment, Storage, Waste storage, Optimization, Management, Annual costs, Capital cost, Biochemical Oxygen Demand, Suspended solids, Sites, Heavy metals, Planning, Project planning, Multiple purpose projects.
Identifiers: *Urban stormwater discharges, Street refuse, Site specific factors, Prediction models.

This study analyzes the cost of abating pollution from combined sewer overflows and urban stormwater; the impact of these discharges on receiving waters; and the pollution potential of these discharges. Continuous simulation runs using one year of hourly data were made to determine the attainable level of pollution control with a specific availability of storage volume and treatment rate in five cities--Atlanta, Denver, Minneapolis, San Francisco, and Washington, D.C. This procedure was used to derive generalized equations relating pollution control to storage and treatment. These results were combined in a simple optimization which determined the optimal mix of storage and treatment for any feasible level of control for any city. The nationwide assessment resulted in specific annual and capital investment cost estimates for given levels of control. These costs can be reduced significantly if stormwater pollution control is integrated with best management practices and integrated into a multi-purpose program. The assessment of pollution potential and resulting impact of urban runoff identified direct connections between parameters such as biochemical oxygen demand (BOD) and suspended solids, and the amount of street refuse. Some parameters appear to be related to more site specific factors. Practical limitations necessitate relating pollution abatement to BOD and suspended solids. (Nessa-NC)
W78-00752

CONTROL OF WATER POLLUTION IN NEW YORK CITY,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 6E.
W78-00796

5E. Ultimate Disposal Of Wastes

SEWAGE EFFLUENT DISPOSAL THROUGH CROP IRRIGATION,
Wisconsin Univ., Madison. Dept. of Soils.
C. D. Henry, R. E. Moldenhauer, L. E. Engelbert, and E. Truog.
Sewage and Industrial Wastes, Vol. 26, No. 2, p 123-135, February 1954. 4 fig, 3 tab, 11 ref.

Descriptors: *Crops, *Waste disposal, Food, *Irrigation effects, *Sewage effluents, Biochemical oxygen demand, Data collections, Disinfection, Fertilizers, Ground water, Infiltration, Land use.
Identifiers: *Meat packing wastes.

Investigations were carried out to provide information under certain specific conditions with regard to the amount of wastewater that can be applied, and its effect on crops, soil, and ground water conditions. Investigations on the disposal of sewage effluent through irrigation from Oscar Mayer and Company packing plant were begun in August, 1950; initially by lysimeters on various soil types, and later by the field irrigation method. Irrigation on Reed canary grass, followed treatment by primary settling and trickling filters. Samples of effluent used for irrigation were taken. Concentration of various ions of sodium and total concentration of cations (in equivalents per million) of the effluent were 79.5 and 37.2 respectively. Comparable values required for suitable irrigation are 80 and 25, which indicated that this effluent is not particularly suited for irrigation. The effectiveness of the soil and crops to remove nitrogen, phosphorous, potassium, and coliform bacteria from the effluent percolated through the soil is tabulated. (Prodehl-EPA, Corvallis)
W78-00514

EFFECTS OF SLUDGE APPLICATIONS ON SOIL WATER AND VEGETATION IN A NORTHERN HARDWOOD FOREST IN NEW ENGLAND,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W78-00567

DISCUSSION 'REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,' BY R.E. MARKLAND, ET AL.,
Meta Systems, Inc., Cambridge, MA.
J. Kuhner, and J. J. Harrington.
Water Resources Bulletin, Vol. 13, No. 4, p 847-852, August 1977. 15 ref.

Descriptors: *Regions, *Planning, *Waste water disposal, *Optimization, *Mathematical models, Land, Equations, Algorithms, Water quality, Decision making, Constraints, Alternative planning, Linear programming, Economic efficiency, Systems analysis.
Identifiers: *Mixed-integer programming.

In the paper by Markland, et al., an interesting application of mixed-integer programming (MIP) to a public planning problem is demonstrated. Large-scale models of this type are rarely used due to the costs involved in setting up the model, acquiring and preparing the input data, and applying the MIP-algorithm. Therefore, a discussion of this paper is presented in which the major concerns are: the set up and relevance of the model; the performance of IBM's MIP-algorithm; the notion of the 'best plan;' and the usefulness of the results. The writers criticize that the authors' model is clearly oversophisticated in the light of the quality of the data used as input. Discussed are aspects which diminish the usefulness of searching for the single best plan. Although Markland, et al., should be comended for tackling this regional planning problem by mathematical programming which yields few useful results and those quite inefficiently, it is concluded. Recommended is an approach which eliminates the notion of 'best plan,' replacing it with 'alternative non-inferior plans' and the concept of 'Pareto Admissibility.' (See also W76-11706) (Bell-Cornell)
W78-00644

WATER QUALITY AND EFFLUENT STANDARDS OF HAWAII,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-00652

DISTRIBUTION OF INJECTED WASTEWATER IN THE SALINE LAVA AQUIFER, WAILUKU-KAHULUI WASTEWATER TREATMENT FACILITY, KAHULUI, MAUI, HAWAII,
Geological Survey, Menlo Park, CA. Water Resources Div.; Geological Survey, Reston VA.; and Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-00814

OCEAN DUMPING -- RESEARCH AND MONITORING OF OCEAN DISPOSAL EFFECTS,
National Oceanic and Atmospheric Administration, Rockville, MD.
For primary bibliographic entry see Field 5C.
W78-00830

ENVIRONMENTAL ASPECTS OF DRILLING FLUID AND DRILL CUTTINGS DISPOSAL,
Exxon Co., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-00833

5F. Water Treatment and Quality Alteration

LEGAL CRITICAL FACTOR ANALYSIS (IN COMPLIANCE WITH THE AREA-WIDE WASTE TREATMENT MANAGEMENT PLANNING PROGRAM).
Miami Valley Regional Planning Commission, Dayton, OH.
For primary bibliographic entry see Field 5G.
W78-00651

HOW WILL SMALL UTILITIES COMPLY WITH THE SAFE DRINKING WATER ACT,
Washington State Dept. of Social and Health Services, Olympia.
For primary bibliographic entry see Field 5G.
W78-00655

REGULATIONS: REACTIONS AND RESOLUTION.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00656

5G. Water Quality Control

ATMOSPHERIC REAERATION IN A LAKE,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
S. L. Yu, T. J. Tuffey, and Drun-Sun Lee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 849, Price codes: A04 in paper copy, A01 in microfiche. Rutgers Water Resources Research Institute, Completion Report, August 1977. 50 p, 17 fig, 5 tab, 38 ref. OWRT A-041-NJ(1). 14-31-0001-5031.

Descriptors: *Reaeration, Wind velocity, *Oxygenation, Hydrodynamics, New Jersey, *Dissolved oxygen, Water quality, Wind, Oxyge, *Turbulence, Estuaries, Lakes, Reservoirs, *Mass transfer, *Boundary layers.
Identifiers: Estuary modeling, *Spruce Run Reservoir(NJ), *Reaeration coefficient.

An investigation of reaeration and its relationship to aerodynamic and hydrodynamic variables was conducted. Mass transfer and boundary layer theories are utilized to formulate a functional relationship between the reaeration coefficient and

pertinent physical parameters. Field work was carried out in Spruce Run Reservoir (located in Central N.J.) to obtain actual measurements of these parameters. Correlation analysis was then performed to yield several best-fit equations. Wind speeds were measured at three different heights above the surface level of the water within the plastic-lined circular pools, which were the apparatus adopted for experimentation. Results show that wind speed is a limiting factor affecting reaeration in a lake. The highest correlation was with the wind speed at the lowest height, indicating that the reaeration coefficient, K2, is a function of surface turbulence created by wind. The prediction equations thus generated assume a linear relationship between the reaeration coefficient and the wind speed. This relationship is considered to be applicable from a critical wind speed where air motion transfers from the hydraulically smooth regime to the transition regime, and then to the wind speed at which waves start breaking. The water depth was inversely proportional to K2. This demonstrates that the overall liquid film coefficient is directly proportional to wind speed. The result showing the existence of a critical wind speed below which reaeration does not significantly vary agrees well with the theoretical consideration and with the results obtained in laboratory tanks by previous researchers. The derived prediction formulas, though of simplistic form, would shed some light on the uncertainties still existing on this subject due to the incorporated wind parameter inherent of stochastic nature. These equations are capable of predicting reaeration coefficients of water systems under the circumstance where the air motion is a predominant source of turbulence.
W78-00561

ADVANTAGES AND DISADVANTAGES OF REGIONAL SEWERAGE SYSTEMS,
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
W. Whipple, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 826, Price codes: A02 in paper copy, A01 in microfiche. Partial Completion Report, presented at 13th Annual Meeting, AWRA, Tucson, Arizona, October 31-November 3, 1977. 13 p, 2 fig, 13 ref. OWRT A-048-NJ(2). 14-34-0001-8032.

Descriptors: *Sewage, *Water quality, *Pipelines, *Interceptor sewers, *Environmental effects, *Land use, *Urbanization, Sewage treatment, Sewerage, Sewage systems, Sewage disposal, Low flow, Regional analysis.
Identifiers: Land use planning, Land use development, *Regional sewerage systems.

A few years ago, many water quality administrators were convinced that large regional sewerage systems, consisting of one large treatment plant and long trunk sewers extending out to various communities, represented the only efficient and economical means of assuring water quality control. In communities favoring rapid development, the provision of sewer service and encouragement of development of new centers along the trunk sewers offered an additional advantage. More recently quite different points of view are arising in certain areas. In parts of New Jersey strong environmental and community resistance has arisen to proposed central plant-trunk sewer systems. The facilitating of new development along the trunk sewers is viewed as a menace by townships which do not want intensive development of these areas. The diversion of effluent flows to trunk sewers rather than septic tanks would dry up the streams which water quality programs are supposed to protect. Both sides to the controversy have mobilized engineering, environmental, economic and legal expertise and some critical policy issues have developed. Reconsideration of regional sewerage management and particularly trunk sewer policy is required. The decision as to extent of sewerage service areas involves complex and sensitive planning issues. Because of potential conflicts of interest, such decisions should not be left to staffs of sewerage authorities and their design engineers.
W78-00562

THE IMPACT OF WATER SAVING DEVICE INSTALLATION PROGRAMS ON RESOURCE CONSERVATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 3D.
W78-00563

DISPERSAL AND ALTERATION OF OIL DISCHARGED ON A WATER SURFACE,
Chevron Oil Field Research Co., La Habra, CA.
For primary bibliographic entry see Field 5B.
W78-00575

CRITICAL SPECIES, INCLUDING MAN, WITHIN THE BIOSPHERE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr.
Die Naturwissenschaften, Vol. 62, p 193-199, 1975. 5 fig, 25 ref.

Descriptors: *Ecosystems, *Environmental control, *Protection, *Waste assimilation capacity, Water quality, Industrial wastes, Treatment facilities, Wastes, Monitoring.
Identifiers: *Quality control, *Environmental quality, Critical species.

The protection of critical ecosystems appears to be a sounder management strategy than the protection of critical species. Environmental quality-control systems designed to protect ecosystems are described herein. These quality-control systems will make it possible to optimize the ability of ecosystems to assimilate and transform wastes and protect them from degradation. The article begins with an identification of critical species and discusses the difficulties in establishing an adequate critical-species list. Given is a list of benefits likely to result from the approach recommended herein. Discussed are fundamental assumptions upon which the environmental quality-control systems are based. Considered are an in-plant-early warning system or biological monitoring system for industrial wastes, including in-stream systems. The environmental quality-control assimilative capacity approach is justified in terms of our dependency upon the capacity of the environment to assimilate and transform societies' waste; we must develop organizational and managerial capabilities to insure quality control. Biological-chemical-physical information systems coupled with these capabilities should enable us to optimize our use of assimilative capacity and at the same time protect other qualities on a continuing basis. (Bell-Cornell)
W78-00619

WATER FOR ENERGY: AN APPROACH TO COMPREHENSIVE IMPACT ASSESSMENT,
New Mexico State Univ., University Park. Dept. of Agricultural Economics and Agricultural Business.
For primary bibliographic entry see Field 6G.
W78-00624

A COMPUTER PROGRAM FOR MODELING OF WATER QUALITY PARAMETERS IN STEADY STATE MULTI-DIMENSIONAL NATURAL AQUATIC SYSTEMS, (SECOND EDITION),
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W78-00632

SNSIM1/2 'A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,'
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W78-00633

AN URBAN MODEL FOR THE EVALUATION OF ALTERNATIVE GROWTH POLICIES,
Oklahoma Univ., Norman. Bureau of Water and Environmental Resources Research.
For primary bibliographic entry see Field 6A.
W78-00649

LEGAL CRITICAL FACTOR ANALYSIS (IN COMPLIANCE WITH THE AREA-WIDE WASTE TREATMENT MANAGEMENT PLANNING PROGRAM).
Miami Valley Regional Planning Commission, Dayton, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 378, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-208-MVRPC-M7, March 1976. 219 p.

Descriptors: *Ohio, *Water management(Applied), *Water quality, *Water quality control, Waste water treatment, Waste water control, Water pollution, Water quality, Water treatment, Sanitary engineering, Sewage disposal, Sewage treatment, Water pollution control, Water pollution treatment, Water quality standards, Water law, Governments, Administrative agencies, State governments, Governmental interrelations, Municipal wastes.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, Miami Valley.

Under the provisions of Section 208 of the Federal Water Pollution Control Act (FWPCA) Amendments of 1972, planning agencies, preparing to implement an area-wide water quality plan must first submit a report to the Administrator of the Environmental Protection Agency (EPA) analyzing the legal capacities of any governmental unit which might be engaged in water pollution control activities in the area. The Miami Valley Regional Planning Commission has submitted this report in preparing a water quality management program for a five-county region in Ohio. The legal functions and powers of eleven types of governmental units are analyzed in comparing the statutory powers of each unit with the management agency descriptions provided by the FWPCA and the implementing guidelines issued by the EPA in 1975. The governmental entities reviewed include the Ohio Environmental Protection Agency, the Ohio Water Development Authority, the Ohio Department of Natural Resources, regional water and sewer districts, Regional Planning Commissions, soil and water conservation districts, and certain municipal corporations. (Sloan-Florida)
W78-00651

WATER QUALITY AND EFFLUENT STANDARDS OF HAWAII,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
G. L. Dugan, R. H. F. Young, and L. S. Lau.
Journal of the Hydraulics Division, Proceedings of ASCE, Vol 100, No 9, p 1245-58, September, 1974. 19 ref.

Descriptors: *Waste water(Pollution), *Waste water treatment, *Hawaii, *Legislation, *Water quality standards, Oceans, Coasts, Oxygen demand, Eutrophication, Oxygen requirements, Nitrogen, Nitrogen cycle, Nitrification, Sewage disposal, Water Quality Act, Sediment discharge, Outlets, Effluents, Treatment facilities, Waste treatment, Water treatment.
Identifiers: *Coastal waters, *Coastal zone management, *Federal Water Pollution Control Act Amendments of 1972, *Marine ecosystems,

*Marine environment, Effluent guidelines, Effluent limitations, State policy, Non-point sources(Pollution), National Pollution Discharge Elimination System, Ocean outfalls.

The increased population and rapid development taking place in Hawaii have caused concern over environmental degradation and water quality management. Experience obtained from water quality standards in mainland river basin systems is ineffective because of Hawaii's island nature. The problem is the ability of the coastal zone to assimilate increasing waste loads. Present water quality standards in Hawaii are inadequate to protect the state's environmental, esthetic, and economic interests. Attempts to develop standards to meet future problems have been partially successful, and continuing collection of data will add to the efficacy of future standards. Laws modeled on river basin systems have been ineffective in Hawaii where all wastes are disposed of in the coastal zone. The chemistry of waste decomposition differs in the receiving waters of deep ocean outfalls. Federal guidelines based on inland problems do not adequately correct Hawaii's coastal problems. State provisions based on Hawaii's unique geography are necessary for maintenance of effective water quality standards. (Molloy-Florida)
W78-00652

EFFECTS OF NEPA'S REVIEW AND COMMENT PROCESS ON WATER RESOURCE PLANNING (SURVEY RESULTS),
Stanford Univ., Calif. Dept. of Engineering.
For primary bibliographic entry see Field 6G.
W78-00654

HOW WILL SMALL UTILITIES COMPLY WITH THE SAFE DRINKING WATER ACT,
Washington State Dept. of Social and Health Services, Olympia.
J. C. Pluntze.
Water and Sewage Works, Vol 124, No 1, p 50-53, January 1977. 5 tab, 2 ref.

Descriptors: *Potable water, *Utilities, *Water analysis, *Chemical analysis, Water works, Public health, Domestic water, Water purification, Water chemistry, Water pollution, Impaired water quality, Water pollution control, Water quality control, Water treatment, Water pollution treatment, Water sampling, Testing, Water supply, Standards, Monitoring, Turbidity, Economic impact, Heavy metals.
Identifiers: *Safe Drinking Water Act.

Small utilities are most affected by the Safe Drinking Water Act and related Environmental Protection Agency (EPA) regulations. Inadequate financing, planning and management make compliance more difficult for water utilities with less than 1000 service connections. Bacteriological sampling is now mandatory for almost all utility systems. Frequency of monitoring is specified and improvement in water treatment will be required. With the exception of turbidity, small utilities already in compliance with the 1962 Public Health Service Drinking Water Standards will have little extra to do to meet these requirements. However, the financial burden on facilities for the removal of heavy metals, nitrates and pesticides is not yet clear. Among the benefits to small utilities are research grants, training of waterworks operators and a better informed public. EPA suggestions to help small utilities achieve compliance include regionalization to spread cost, development of new sources not requiring treatment, blending of sources, purchasing water from another utility, and development of a satellite system to centralize cost and management. It is suggested that public funds be made available to assist small utilities. Five data tables supplement the article. (Mulligan-Florida)
W78-00655

REGULATIONS: REACTIONS AND RESOLUTION.
Environmental Protection Agency, Washington, DC.
Journal of the American Water Works Association, Vol 68, No 2, p 77-82, February 1976.

Descriptors: *Regulation, *Potable water, *Municipal water, *Water supply, Water law, Safety factors, Water quality control, Water temperature, Utilities, Waste, Sodium, Sulfates, Asbestos, Monitoring, Measurement, Organic pesticides, Organic compounds, Cost analysis, On-site investigations, Administrative agencies, Water consumption.
Identifiers: *Safe Drinking Water Act, Public hearings, Notice.

The Interim Primary Drinking Water Regulations required by the Safe Drinking Water Act were proposed in March 1975 to be effective 18 months later. The Environmental Protection Agency (EPA) requested public comments on the proposed regulations. This article is a survey of the issues raised by the public's comments and an explanation of the agency's response. Of public concern was the proposed definition of a 'public water system' and how, under that definition, the interim regulations would affect small community and noncommunity water systems. Other comments involved the selection of substances for establishing Maximum Contaminant Levels, what the proper contaminant levels should be, where they should be measured and what safety factors should be introduced. The author also discusses the issue of proper public notice, the value of adequate record keeping and the results of the EPA's economic and cost analysis of the regulations. Although there are technical problems in implementing the Safe Drinking Water Act, the cooperation of members of the professional community can make the legislation work. (Curran-Florida)
W78-00656

SUCCESS STORIES IN MULTIPLE USE,
Bureau of Outdoor Recreation, Ann Arbor, MI. Lake Central Region Office.
For primary bibliographic entry see Field 6B.
W78-00660

FARRUGIA V. FREDERICK (DENIAL OF CANAL PERMIT BASED ON ADVERSE EFFECTS UPON WATER QUALITY).
For primary bibliographic entry see Field 6E.
W78-00670

THE VELUWE ARTIFICIAL RECHARGE PLAN WATER QUALITY ASPECTS,
Rijksinstituut voor Drinkwatervoorziening, The Hague (Netherlands).
B. C. J. Zoeteman, I. J. Hrubec, and F. J. J. Brinkmann.
Journal of the Institution of Water Engineers and Scientists, Vol. 30, No. 3, p 123-137, May 1976. 11 fig, 2 tab.

Descriptors: *Groundwater recharge, *Artificial recharge, *Pre-treatment(Water), *Water quality, Water treatment, Clogging, Tunnels, Aquifers, Recharge ponds, Canals, Pilot plants, Laboratory tests, Evaluation, Coagulation, Sedimentation, Filtration, Chlorination, Foreign research, Foreign countries.
Identifiers: *Netherlands.

Water quality aspects were discussed considering two types of artificial recharge systems: (1) underground tunnels; and (2) open canals or ponds. Both systems were studied in a pilot plant located at Leiduin, the dune area near Amsterdam, The Netherlands. Effects of different grades of water treatment on performance of both types of recharge systems were determined. A pretreatment system was proposed that consists of at least coagulation, sedimentation, ozonisation, secondary coagulation, biological filtration, breakpoint chlorination, and activated carbon filtration. In this way it is expected that high recharge rates of approximately 10 m/day and long recharge runs of several years in case of exclusion of light can be realized. As the quality of the water to be recharged is comparable to that of drinking water, contamination of the soil and pollution of local water resources by eventual losses of recharged water will be very limited. Those substances that are accumulated in the soil are concentrated mostly in the top-layer of the recharge medium, and practically all will be removed during cleaning of mechanically clogged sand layers. Underground storage of water gives different advantages over open storage in reservoirs, like reduction of temperature fluctuations, exclusion of light, limited claim on space, and better protection of the stored water, e.g., against pollution from the atmosphere. The advantages make artificial recharge a preferable water storage technique to open reservoirs in case of a free choice between the two techniques can be made. (Humphreys-ISWS)
W78-00690

AERATION OF HYDRO RELEASES AT FT. PATRICK HENRY DAM,
Tennessee Valley Authority, Chattanooga. Water Quality and Ecology Branch.
R. J. Ruane, S. Vigander, and W. R. Nicholas.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY10, Proceedings Paper 13291, p 1135-1145, October 1977. 7 fig, 2 tab, 5 ref, 1 append.

Descriptors: *Aeration, *Oxygenation, *Tennessee, *Dissolved oxygen, *Hydroelectric plants, Powerplants, Diffusion, Bubbles, Oxygen, Water quality, Reservoirs, Turbines, Hydraulic turbines, Dams, Discharge(Water).
Identifiers: *Ft. Patrick Henry Dam(Tenn), Diffusers.

A method was developed for increasing dissolved oxygen concentrations in the turbine releases from hydroelectric power plants. A systematic procedure was used for evaluating promising solutions to low DO concentrations. The method selected for development at Fort Patrick Henry Dam was oxygen injection by use of small pore diffusers located upstream from the turbine intakes. Laboratory tests included determination of bubble sizes and oxygen transfer efficiency. Field tests for oxygen transfer efficiency were performed for 2 different diffusers. Additional tests were performed to assess the effect of spacing between diffusers on oxygen transfer efficiency. (Sims-ISWS)
W78-00711

INLAND LAKE PROTECTION IN NORTHERN MICHIGAN (NORTHERN MICHIGAN ENVIRONMENTAL RESEARCH PROGRAM EDUCATIONAL SERIES: PUBLICATION NO. 1),
Michigan Univ., Ann Arbor, Biological Station.
For primary bibliographic entry see Field 6G.
W78-00716

AN ASSESSMENT METHODOLOGY FOR THE ENVIRONMENTAL IMPACT OF WATER RESOURCE PROJECTS,
Battelle Columbus Labs., OH.
For primary bibliographic entry see Field 6G.
W78-00750

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME I-SUMMARY REPORT,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 6G.
W78-00753

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME II-DETAILED ANALYSES AND SUPPORTING MATERIALS,
Oklahoma Univ., Norman. Science and Public Policy Program.
For primary bibliographic entry see Field 6G.
W78-00754

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME III-PRELIMINARY POLICY ANALYSIS,
Oklahoma Univ., Norman. Science and Public Policy Program.
For primary bibliographic entry see Field 6G.
W78-00755

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME IV-APPENDICES,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 6G.
W78-00756

APPLICATION OF NUMERICAL CLASSIFICATION IN ECOLOGICAL INVESTIGATIONS OF WATER POLLUTION,
Virginia Inst. of Marine Sciences, Gloucester Point, VA.
For primary bibliographic entry see Field 6G.
W78-00771

IMPLEMENTATION PLAN FOR THE COST OF A CLEAN ENVIRONMENT REPORT.
Control Data Corp., Rockville, MD. Professional Services Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 911, Price codes: A04 in paper copy, A01 in microfiche. Prepared for Washington Environmental Research Center, U.S. Environmental Protection Agency, Washington, D.C., July 29, 1974, 46 p, 9 fig. 68-01-2013.

Descriptors: *Cost analysis, *Cost comparisons, *Environmental control, *Environmental effects, Pollutants, Pollution abatement, Treatment facilities, Annual costs, Basic data collections, Air pollution effects, Water pollution, Water pollution effects, Water pollution sources, Federal Water Pollution Control Act, Clean Air Act.
Identifiers: *Cost of a Clean Environment(CCE).

This report describes the approach used to develop the 1975 Cost of a Clean Environment (CCE) report. The study begins with the effects of pollution and works toward identifying the sources and technologies that apply to those sources. A literature search was conducted to document the effects of pollution. Pollutant sources were categorized by sector, and then detailed studies for specific source categories within the sectors were conducted. Alternate control technologies are identified for specific source categories, along with associated cost functions and sufficient treatment data to determine annual costs for each alternative. This information is then expanded to give national data by sector. The information and analysis produced by the detailed source studies were used to estimate control costs. Cost functions and associated treatment data from these studies were used to forecast abatement costs for selected years. Standard analysis summary sheets can provide information aggregated to state, federal region or national levels, and can be sorted by pollutant type or by sector. The CCE report is compiled in order to provide Congress with information regarding the cost of pollution controls necessary to achieve legislated air and water quality standards. This report explains how the cost study has been streamlined. (Nessa-NC)
W78-00772

ENVIRONMENTAL ASSESSMENT PERSPECTIVES,
GCA Corp., Bedford, MA. GCA Technology Div.
P. F. Fennelly, M. T. Mills, S. M. Weinstein, D. F. Durocher, and A. S. Werner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 911, Price codes: A11 in paper copy, A01 in microfiche. Report EPA 600/2-76-069, March 1976. 238 p, 27 tab, 26 fig, 5 append. 68-02-1316, Task 13.

Descriptors: *Assessments, *Energy, Pollutant identification, *Data acquisition, *Methodology, *Environmental effects, Standards, Basic data collections, Model studies, Regulation, Monitoring, Sampling, Analytical techniques, Mathematical models, Testing.
Identifiers: *Environmental assessment, *Energy system development.

The purpose of this study is to define the environmental assessment (EA) process in relation to energy system development. The report defines EA programs and their roles in energy system development; indicates data requirements of an EA; outlines methodologies for acquiring the necessary data; serves as a technology transfer vehicle by providing background information on environmental monitoring and modeling which can be used in EA's; summarizes the extent, quality, applications, and location of existing information resources which can be used in planning of EA's; and summarizes existing or proposed standards and criteria for evaluating air, water, and land based pollution. Included in the report are: waste stream characterization and pollution identification; identification of indirect pollution associated with energy system development; evaluation of environmental impact; estimating the sphere of influence of an energy system; mehtodology for conducting source tests; use of dispersion models; available data banks and information sources; and existing and proposed environmental regulations. Each topic is explored to the extent necessary to acquaint the user with current standards, sampling and analytical techniques, and environmental models. General discussions are supplemented with specific examples. (Nessa-NC)
W78-00773

INTERNATIONAL OCEAN INSTITUTE,
Center for the Study of Democratic Institutions, Santa Barbara, CA.
For primary bibliographic entry see Field 6E.
W78-00780

SOUTHERN DISCOMFORT - LEARNING TO LIVE WITH THE WATER ACT,
L. Popovich.
Journal of Forestry, Vol. 74, No. 8, p. 532-38, August 1976.

Descriptors: *Forest management, *Forestry, *Water quality control, *Permits, Governmental interrelations, Stagnant waters, Standing waters, Running waters, Wet-lands, Aquatic vegetation, Standards, Water quality standards, Water pollution control, Pulp and paper industry, Land management, State governments, Water quality, Administrative agencies, Adoption of practices, Administration, Administrative decisions.
Identifiers: *Nonpoint sources(Pollution), *Corps of Engineers, *Federal Water Pollution Control Act Amendments of 1972, *Environmental Protection Agency, Point sources(Pollution), Administrative regulations.

Phase III of the Corps of Engineers water quality regulations under Section 404 of the Federal Water Pollution Act Amendments of 1972 extended the Corps' permit authority to include all of the waters of the United States. Forestry interests were wary that the Corps would institute a one-permit-per-culvert approach, which would result in high costs and delays in obtaining permits. They also feared that the Corps' definition of 'aquatic vegetation' would require them to get wetland permits for areas which, up unitl now, had been considered standing water. The Environmental Protection Agency (EPA) concern lies with state regulation under Section 208 of the Act, the program for controlling nonpoint pollution. Of the Acknowledged sources of water pollution from forestry practices, very few are considered point sources subject to permits. The EPA's 'best management practices' program for achieving water quality standards is difficult to comply with since few best management practices have been identified. Cooperation between foresters, the EPA and the Corps will make implementation of water quality standards easier for everyone. (Kastner-Florida)
W78-00781

WATER QUALITY WORKSHOPS: TALKING IT OVER WITH EPA,
American Forestry Association, Washington, DC.
R. Paido.
Journal of Forestry, Vol. 74, No. 8, p. 539-40, 545, August 1976.

Descriptors: *Forest management, *Regulation, *Water quality control, *Forestry, Water quality standards, Standards, Administrative agencies, Water pollution control, Legislation, Farms, Land management, Pulp and paper industry, Governmental interrelations, Water quality, State governments, Watershed management.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, *Nonpoint sources(Pollution), Point sources(Pollution), Administrative regulations.

Section 304 of the Water Pollution Control Act Amendments of 1972 directed the Environmental Protection Agency (EPA) to issue guidelines to the states to control nonpoint sources of pollution including 'silvicultural activities', which has been interpreted to cover forestry practices and production. The EPA, following the 'best management practices' approach, instructed each state to develop a '208 program' which would assure that the operation of private farms and forestlands minimized the chances of water pollution. The forestry interests reacted strongly to the EPA's model state forestry practices act. Recognizing its lack of forestry knowledge, and the need for forestry interests to know more about the EPA, nonpoint source pollution and the Water Pollution Control Act, the EPA provided a grant for nationwide workshops on forest practices and water quality. The consensus of the workshops was that federal regulation of forestry practices was not needed to comply with the Federal Water Pollution Regulations and that the coordination of the activities of the EPA under the Water Pollution Control Act, and the Forest Service, under the Resources Planning Act, would produce more effective results. (Kastner-Florida)
W78-00782

U.S. INDUSTRY AND STATES URGE A RETHINK OF WATER QUALITY LAW.
Chemical Engineering, Vol. 83, No. 6, p. 76, 78, March 1, 1976.

Descriptors: *Federal Water Pollution Control Act, *Industries, *Economic impact, *Cost-benefit analysis, Economic feasibility, Economic justification, Economic evaluation, Legislation, Water pollution, Water quality act, Federal jurisdiction, State jurisdiction, Federal government, Administrative agencies, Benefits, Costs, Decision making, Investigations, Economic predictions, Annual benefits, Annual costs, Pollution abatement, Water pollution control.
Identifiers: Environmental policy, National Commission on Water Quality, Administrative regula-

tions, Effluent limitations, Effluent guidelines, Environmental Protection Agency, State policy, Best Practicable Technology, Best Available Technology, Public hearings.

Witnesses from private industry as well as from several state pollution-control agencies criticized the Federal Water Pollution Control Act at hearings held throughout the country by the National Commission on Water Quality (NCWQ) in January of 1976. The concensus at the hearings, held to discuss NCWQ's 2-1/2 year study of the Act, was that while the Act's 1977 goals are realistic, those set for 1983 are not cost-effective. Witnesses strongly contested NCWQ's estimates that the Act would provide the nation $3.4 billion in annual economic benefits by 1980, and $7.8 billion per year by the turn of the century. The Environmental Protection Agency was also attacked for not being flexible in its administration of the Act. Only environmental-action groups generally felt that the Act's deadlines should not be extended. In response to the suggestion that a freeze be put on the Act after the 1977 improvement levels are reached, environmental groups claimed that increasingly stricter controls were necessary to safeguard gains in water quality made by 1977. NCWQ was expected to issue a final report on its study, including input from the hearings, in March of 1976. (Malefatto-Florida)
W78-00785

PRESIDENT ANNOUNCES MEASURES TO CONTROL MARINE OIL POLLUTION,
Executive Office of the President, Washington, DC.
For primary bibliographic entry see Field 6E.
W78-00786

THE ROLE OF INSURANCE IN ENVIRONMENTAL LITIGATION,
McKenna, Storer, Rowe, White and Farrug, Chicago, IL.
For primary bibliographic entry see Field 6F.
W78-00789

OIL POLLUTION OF COASTAL AND INLAND WATERS UNDER THE WATER QUALITY IMPROVEMENT ACT OF 1970,
Mendes and Mount, New York.
A. A. Lohne.
Insurance Counsel Journal, Vol. 38, No. 1, p 49-62, January 1971.

Descriptors: *Oil spills, *Federal jurisdiction, *Oil pollution, *Water pollution control, Water pollution sources, Water quality standards, Law enforcement, Legislation, Rivers and Harbors Act, Oily water, Water law, Oil wastes, Waste water(Pollution), Navigable waters, Oceans, Beaches, Legal aspects, Coasts, Compensation, Inland waterways.
Identifiers: Liability, *Water Quality Improvement Act, Nuisance(Legal aspects), Absolute liability, Oil-spill cleanup, Outer continental shelf, Coastal waters, Vessels, Tankers.

Oil spillage is causing increasing damage to this country's waters. To combat water pollution in general and oil pollution in particular, Congress has passed many laws including the Water Pollution Act of 1886, the River and Harbor Act of 1899, the Oil Pollution Act of 1924, the Oil Pollution Act of 1961 and the 1966 Clean Water Restoration Act. The Water Quality Improvement Act of 1970 made many changes to help prevent oil pollution and to control it after it has occurred. The Act prohibits the discharge of oil in harmful quantities into navigable waters. It provides for a plan to remove oil and makes the owner of any vessel discharging oil liable for actual costs unless the spillage falls under one of the stated exceptions. It requires proof of financial stability to the extent of liability. The Act allows government forces to control and clean up oil already on the beaches. In addition beach front property owners affected by oil spills are helped because the National Contingency Plan which calls for immediate clean up includes private property. The Act also provides for enforcement of its provision by the Coast Guard. (Maass-Florida)
W78-00790

CLEAN WATER PROGRESS - YES, SPEED - NO,
Committee on Public Works and Transportation (U.S. House).
J. Wright.
Water and Sewage Works, Vol 123, No 4, p cover, 4, 63, April 1976.

Descriptors: *Future planning(Projected), *Waste water(Pollution), *Water pollution control, *Federal Water Pollution Control Act, Water quality, Water quality control, Sewage treatment, Industrial wastes, Municipal wastes, Water treatment, Water pollution, Water pollution treatment, Water quality standards, Discharge(Water), Pretreatment(Water), Treatment facilities, Construction, Construction costs, Legislation.
Identifiers: Effluent guidelines, Environmental policy, Federal Water Pollution Control Act Amendments of 1972, *National Pollution Discharge Elimination System, Effluent limitations, Non-point sources(Pollution), Point sources(Pollution).

It is becoming obvious that the deadlines set by the Federal Water Pollution Control Act Amendments of 1972 cannot be met. Half the municipal wstes will not meet Environmental Protection Agency (EPA) standards for secondary treatment, while storm run-off from non-point sources will pollute streams far beyond legal levels. the Act was unrealistic regarding deadlines and the overly dominant role of the Federal Government. Surprisingly few projects are being constructed under the Act because of the voluminous regulations of the EPA, the inability of municipalities to fund their twenty-five percent share, the controversy and uncertainty over environmental issues,the issue of pretreatment of industrial wastes, the unpopularity and unworkability of certain requirements, and the lack of personnel in the EPA and in the States to process grant applications. Congressional attempts to remedy the problems include bills to enable local certification of compliance with the construction grants, to authorize local ad valorem taxes to fund plants, and to authorize the EPA to adjust deadlines on a case-by-case basis. Public support is crucial for the water pollution program to sustain its forward momentum. (Jones-Florida)
W78-00791

REPUBLIC STEEL CORPORATION V. TRAIN (ENVIRONMENTAL PROTECTION AGENCY PERMIT OBJECTION IMPROPER WHERE NO GUIDELINES AVAILABLE).
For primary bibliographic entry see Field 6E.
W78-00792

CONTROL OF WATER POLLUTION IN NEW YORK CITY,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 6E.
W78-00796

UNITED STATES V. HAMEL (GASOLINE AS A POLLUTANT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
For primary bibliographic entry see Field 6E.
W78-00797

JURISDICTIONAL EXPANSION OF THE ARMY CORPS OF ENGINEERS UNDER FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
M. G. Ehrilch.
Houston Law Review, Vol. 13, No. 1, p. 135-52, October, 1975.

Descriptors: *Permits, *Federal jurisdiction, *Dredging, *Wetlands, Landfills, Federal Water Pollution Control Act, Administrative agencies, Navigable waters, Boundaries(Property), Rivers and Harbors Act, Wildlife conservation, Judicial decisions, Water pollution, Legislation, Protection, Federal government, Administrative decisions, Legal aspects, High water mark, Regulation.
Identifiers: Fill permits, *Federal Water Pollution Control Act Amendments of 1972, Environmental policy, Administrative regulations, Coastal waters, Hazardous substances(Pollution), Property interests, Territorial waters.

Under the Rivers and Harbors Act the jurisdiction of the Corps of Engineers extended only to the mean high tide line. Since the passage of the Federal Water Pollution Control Act Amendments of 1972, this jurisdiction was extended to 'the waters of the United States'. The refusal of the Corps to recognize its expanded responsibilities prompted federal court action. One court placed dredge and fill operations in the wetlands under federal jurisdiction. Further inaction on the Corps' part resulted in another court order to promulgate dredge and fill regulations for the wetlands. The Corps has developed a three-stage program for expanding its regulating discharges into primary tributaries of navigable waters, and finally expanding its operation to all waters. These expanded powers will surely create jurisdictional disputes with state regulatory agencies and private landowners. However, the Corps and the Congress should maintain jurisdiction over the wetlands to protect the future water needs of the country. (Cocheu-Florida)
W78-00799

THE PROPOSED OUTER CONTINENTAL SHELF LANDS ACT AMENDMENTS OF 1976: AN INADEQUATE GUIDE TO OUTER CONTINENTAL SHELF DEVELOPMENT,
Harvard Law School, Cambridge, MA.
For primary bibliographic entry see Field 6E.
W78-00800

OCEANS '77 CONFERENCE RECORD.
Institute of Electrical and Electronics Engineers, Inc., New York.; and Marine Technology Society, Washington, DC.
Proceedings of 3rd Annual Conference, 'Oceans '77', held in Los Angeles, CA on October 17-19, 1977. 2 Volumes, 800 p. Reference publication No. 77CH1272-4 OEC.

Descriptors: *Oceans, *Oceanography, *Technology, *Conferences, Equipment, Engineering structures, Instrumentation, Resources development, Water pollution, Baseline studies, Environmental effects, Waste disposal, Oil pollution.
Identifiers: *Outer Continental Shelf, Ocean dumping, Hydrocarbons, Offshore platforms, Ocean mining.

Oceans '77 is the third conference in a series jointly sponsored by the Marine Technology Society and the Institute of Electrical and Elctronic Engineers and was held in Los Angeles, CA on October 17-19, 1977. The conference presented nearly 200 papers covering all aspects of man's activity in the seas and is described as an international conference to discuss and explore developing technology and its impact on public policy and education. In addition to the usual technical sessions, the scope of the conference was expanded to include presentations and papers on law, public policy, and education. (See also W78-00828 thru W78-00839) (Sinha-OEIS)
W78-00827

PALAU: NATIVE PARADISE OR PETROLEUM SUPERPORT,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
For primary bibliographic entry see Field 5C.
W78-00828

PORT PLANNING TO MINIMIZE RISK TO HAZARDOUS MATERIAL VESSEL MOVEMENT,
Coast Guard, Washington, DC. Office of Marine Environment and Systems.
J. H. Lancaster.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 1, p 13D-1 - 13D-6, 1977. 1 tab, 4 fig, 7 ref.

Descriptors: *Harbors, *Planning, *Water pollution control, *Pollution abatement, Hazards.
Identifiers: *Outer Continental Shelf, Hazardous materials, Marine transportation.

Trends in recent years in marine transportation and the nature of cargoes handled have placed increasing demands for improved safety and efficiency not only on ships but on the waterways and ports they utilize. Port planning must consider the impact of larger ships, increasing volumes of hazardous cargoes, increasing traffic, increasing industrial and population density, and increased concern for the environment. The problems generally cannot be dealt with on an isolated basis and must be considered within the framework of systematic analysis. Within the marine transportation system, cargo movement (ship movement), cargo transfer, and cargo storage all complement and affect one another. Decisions as to port configuration, site location, vessel traffic, pilotage, surveying and mapping, dredging, aids-to-navigation, tug assistant - all need to be reached on as systematic a basis as is possible. Criteria for and practices in several of the foregoing areas are discussed. (See also W78-00827) (Sinha-OEIS)
W78-00829

OCEAN DUMPING -- RESEARCH AND MONITORING OF OCEAN DISPOSAL EFFECTS,
National Oceanic and Atmospheric Administration, Rockville, MD.
For primary bibliographic entry see Field 5C.
W78-00830

TECHNIQUES FOR MEASURING THE EFFECTS OF NUCLEAR POWER PLANTS ON LOCAL FISH,
Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 5C.
W78-00831

A TECHNIQUE FOR MEASURING INDUSTRIAL WASTE DISPERSION RESULTING FROM OCEAN DUMPING,
EG and G Environmental Consultants, Waltham, MA.
For primary bibliographic entry see Field 5B.
W78-00832

ENVIRONMENTAL ASPECTS OF DRILLING FLUID AND DRILL CUTTINGS DISPOSAL,
Exxon Co., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-00833

EFFECTS OF PRODUCED WATERS ON THE MARINE ENVIRONMENT,
Shell Development Co., Houston, TX; and Exxon Production Research Co., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-00834

FATE OF PETROLEUM HYDROCARBONS IN MARINE ANIMALS,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5B.
W78-00835

WEATHERING OF SPILLED OIL AND METHODS OF ACCELERATING,
Chevron Oil Field Research Co., La Habra, CA.
For primary bibliographic entry see Field 5B.
W78-00836

CEPEX HARDWARE: (NOW AND IN THE FUTURE),
Case Existological Labs. Ltd., Victoria (British Columbia).
For primary bibliographic entry see Field 5C.
W78-00837

PHYSICAL FACTORS AFFECTING THE SITING OF DREDGED MATERIAL ISLANDS,
Texas A and M Univ., College Station. Dept. of Geology.
For primary bibliographic entry see Field 5C.
W78-00838

HAWAII AND THE MANGANESE NODULE INDUSTRY,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
For primary bibliographic entry see Field 6G.
W78-00839

1974 FLOATING BREAKWATERS CONFERENCE PAPERS.
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 8B.
W78-00840

WORKSHOP I: FUTURE USES OF FLOATING BREAKWATERS.
For primary bibliographic entry see Field 8B.
W78-00856

PREDICTION OF ARCTIC ICE CONDITIONS FOR OPERATIONS,
Washington Univ., Seattle. Arctic Ice Dynamics Joint Experiment Office.
M. D. Coon, R. T. Hall, and R. S. Pritchard.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 4, (of 4), p 307-314, OTC 3004, 1977. 10 fig, 1 tab, 25 ref.

Descriptors: *Sea ice, *Forecasting, *Mathematical models, *Resources development, *Environmental effects, *Baseline studies, *Hazards, Drilling, Transportation, Arctic Ocean.
Identifiers: *Outer Continental Shelf, Ice conditions.

A mathematical model is presented as an aid to forecasting of ice conditions for operations in ice-infested waters. The sea ice model interacts with the atmosphere and ocean. The importance of knowledge of ice velocity, thickness distribution, and stress for short-term forecasting of ice conditions is explained. A sample calculation is shown to demonstrate and clarify the results. As a test of the performance of the model, observations during the Arctic Ice Dynamics Joint Experiment (AIDJEX) and Landsat imagery in April 1975 are used to compare with simulated conditions. The response of the model to these conditions is qualitatively reasonable, but insufficient data on barometric pressures and boundary motion affects the comparison. The model is too weak to match the observed motions as accurately as desired. Efforts to eliminate these problems should allow the model to be used as an operational tool to aid in short-term forecasting of sea ice conditions. Planning and conducting activities in waters that are partly or completely covered by ice for part of the year are greatly facilitated by the ability to predict ice conditions. Short-term forecasts are helpful to shipping operations, since they could affect both the selection of a route and the timing of a transit, and to fixed-point operations such as drilling sites or harbors. (Sinha-OEIS)
W78-00860

SEA ICE THICKNESS PROFILING AND UNDER-ICE OIL ENTRAPMENT,
Cold Regions Research and Engineering Lab., Fairbanks, AK.
A. Kovacs.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 3 (of 4), p 547-554, OTC 2949, 1977. 10 fig, 1 tab, 3 ref.

Descriptors: *Sea ice, *Oil pollution, *Water pollution sources, *Blowouts, *Resources development, *Environmental effects, Baseline studies, Alaska.
Identifiers: *Outer Continental Shelf, *Prudoe Bay, Oil entrapment, Oil production.

Results obtained with a unique dual-antenna impulse radar system used to profile first- and multi-year sea ice near Prudhoe Bay, Alaska, are discussed. A description of the radar system is given along with representative field data. Continuous ice thickness profiles are required for studies related to modeling and understanding the dynamics of the sea ice cover, heat exchange between the ocean and the atmosphere to determine the quantity of oil that would be trapped in the undulating bottom relief of first-year and multi-year ice should an oil blowout occur in an ice-covered sea. Calculations are presented that indicate a significant amount of oil could be trapped within this bottom relief should the oil be released under the ice from a sea-floor oil-production system. (Sinha-OEIS)
W78-00861

ENVIRONMENTAL CONDITIONS ON THE CONTINENTAL SHELF OFF WEST GREENLAND,
Danish Inst. of Applied Hydraulics, Copenhagen.
H. A. Nielsen, J. Dietrich, and J. Fabricius.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 3 (of 4), p 533-546, OTC 2948, 1977. 27 fig, 4 tab.

Descriptors: *Continental Shelf, *Meteorological data, *Resources development, *Environmental effects, *Weather data, *Baseline studies, *Oil spills, Ice cover, Icebergs, Drilling.
Identifiers: *Outer Continental Shelf, *Greenland, Davis Strait, Weather conditions.

To provide data on currents, icebergs, ice drift and weather conditions on the Greenland Continental Shelf, comprehensive environmental data collection programs were carried out in 1975 and 1976 both by the Concessionaires (with Chevron Petroleum of Greenland as operator) and by the Ministry for Greenland. The programs of the Concessionaires aimed primarily at providing sufficient data for planning and execution of drilling operations was concentrated on the concession areas. The programs of the Ministry were executed by the Danish Hydraulic Institute and emphasized the effects of possible oil spills upon the sensitive arctic environment. (Sinha-OEIS)
W78-00862

ALONG-SHORE COHERENCE OF WINDS ALONG THE NORTH ALASKAN COAST FOR OIL SPILL ANALYSIS,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5C.

W78-00863

CHEMISTRY OF MARINE PETROLEUM SEEPS IN RELATION TO EXPLORATION AND POLLUTION,
For primary bibliographic entry see Field 5B.
W78-00864

NATURAL OIL SEEP DETECTION IN MARINE ENVIRONMENTS,
For primary bibliographic entry see Field 5B.
W78-00865

MODELING OF OIL SPILL TRAJECTORIES USING SEQUENTIAL SATELLITE IMAGERY,
W. R. McLeod, J. H. Kennedy, and D. T. Hodder.
In: Proceedings of the 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 319-324, OTC 2764, 1977. 9 fig, 8 ref.

Descriptors: *Oil spills, *Alaska, *Baseline studies, *Resources development, *Water quality control, *Environmental effects, Models.
Identifiers: *Outer continental shelf, Gulf of Alaska, Satellite imagery, Trajectories prediction, Prediction.

The Gulf of Alaska waters, eddy patterns appear in enhanced LANDSAT imagery and are stable for months. The eddy patterns themselves extend some 50 miles offshore, and show surface drift complexity, not predicted by present models. These results lead us to alternative ideas of how to predict spill trajectories in a quasi empirical way using satellite data. This detailed level of information is required if one is to control spills on a lease block or platform basis. (Sinha-OEIS)
W78-00866

INTEGRATED ENVIRONMENTAL STUDIES, SOUTH TEXAS OUTER CONTINENTAL SHELF: APPROACH, TECHNIQUES, RESULTS,
H. L. Berryhill, Jr.
In: Proceedings of 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 239-249, OTC 2754, 1977. 3 fig, 1 tab, 3 ref.

Descriptors: *Resources development, *Environmental effects, *Baseline studies, *Exploration, *Water quality, *Methane, *Texas, Nutrients, Productivity, Biology, Metals Runoff.
Identifiers: *Outer continental shelf, Hydrocarbons.

The environmental studied of the South Texas Outer Continental Shelf are part of a national program of environmental studies under the sponsorship of the Bureau of Land Management. The general purpose of the studies is to provide a base of environmental data and an understanding of marine processes for use in managing offshore exploration and development. The results of the first year's effort indicate a strong correlation, both geographically and seasonally, between the various aspects of the marine environment. Biological activity generally is greatest along the shallow waters of the inner shelf where nutrients are introduced by continental runoff. The biological productivity is greatest in the spring when the amount of runoff reaching the ocean is largest. Increased amounts of nutrients at the outer edge of the shelf in the bottom water plus hydrographic characteristics suggest a movement of deeper water onto the outer shelf. Chemically, the region does not differ significantly from other shelf areas in the Gulf of Mexico. Amounts of both trace metals and hydrocarbons are average for shelf areas, and no anomalously large amounts were detected with but one exception. Methane content of the water from mid shelf seaward to the edge of the shelf at mid and near-bottom depths is locally very high and a super-saturated condition is indicated. Geologically, the shelf has undergone seaward tilting or subsidence as a continuing process. The subsidence has been accompanied by extensive faulting, predominantly of the growth type; areally the faulting has migrated basinward through time. (Sinha-OEIS)
W78-00869

EVALUATION OF GEOLOGIC HAZARDS IN OCS PETROLEUM LEASE AREAS, SOUTHERN CALIFORNIA CONTINENTAL BORDERLAND,
M. E. Field, S. H. Clarke, Jr., and H. G. Greene.
In: Proceeding of 9th Annual Offshore Technology Conference, held in Houston, TX, May 2-5, 1977, Vol 1 (of 4), p 69-78, OTC 2736, 1977.

Descriptors: *Hazards, *Geological surveys, *Water pollution, *Seepage, *Resources development, California, Exploration.
Identifiers: *Outer Continental Shelf, Petroleum leases.

Studies to characterize the tectonic and sedimentary environments of potential petroleum lease areas in the southern California continental borderland are being carried out by the U.S. Geological Survey. Major objectives are to identify and develop an understanding of features and processes that may be hazardous to petroleum exploration and development. Geologic phenomena investigated include faulting, seismicity, sediment erosion, mass movement, and hydrocarbon seepage. Data are collected principally by high resolution (0.2-0.8 kJ; 800-200Hz) seismic reflection profiling and sediment sampling with ancillary data from side-scan sonography, underwater television coverage and deep-penetration (120-160 kJ; 40-125 Hz) single-channel seismic reflection profiles. (Sinha-OEIS)
W78-00870

AN EVALUATION OF LOUISIANA SUPERPORT STUDIES AND IMPLICATIONS FOR COASTAL ZONE MANAGEMENT,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
J. H. Stone.
Coastal Zone Management Journal, Vol 3, no 1, p 7-37, 1976. 2 fig, 3 tab, 30 ref.

Descriptors: *Louisiana, *Environmental effects, Water quality, Resources development.
Identifiers: *Outer Continental Shelf, *Superports, Coastal zone management.

The economic and environmental consequences of a proposed Louisiana superport have been studied by researchers during the last three years. These studies provided technical information and management alternatives. Management alternatives included state control to avoid multiple superport developments, details for an Environmental Protection Plan, comparisons of onshore and offshore sites, and planning for ancillary development. Policy decisions which resulted include many of the recommendations of the research. It is suggested that environmental research can influence policy decisions and limit the options available to a decision maker provided some legal structure is created, quality control is implemented, and technological and environmental problems are recognized. Various analytical tools, such as energy cost accounting, group critique, and simulation models, have wide application for use in coastal zone management. (Sinha-OEIS)
W78-00871

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

THE VIRGIN RIVER BASIN STUDY: A REGIONAL APPROACH TO MULTIOBJECTIVE PLANNING FOR WATER AND RELATED RESOURCES,
Nevada Univ. System, Reno. Water Resources Center.
For primary bibliographic entry see Field 6B.
W78-00551

A WATERSHED PLANNING AND MANAGEMENT SYSTEM: DESIGN AND SYNTHESIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Div. of Environmental and Urban Systems; and Virginia Polytechnic Inst. and State Univ., Blackburg. School of Forestry and Wildlife Resources.
For primary bibliographic entry see Field 4D.
W78-00560

HYDROLOGIC MODELING OF THE DEVILS LAKE BASIN WATERSHEDS,
North Dakota Water Resources Research Inst., Fargo.
For primary bibliographic entry see Field 4D.
W78-00569

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: APPLICATION OF LINEAR SYSTEMS ANALYSIS TO GROUND WATER EVALUATION STUDIES,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 2F.
W78-00570

MARKOVIAN PROGRAMMING FOR FLOW REGULATION,
Polish Academy of Sciences, Warsaw. Inst. of Geophysics.
For primary bibliographic entry see Field 4A.
W78-00621

WATER FOR ENERGY: AN APPROACH TO COMPREHENSIVE IMPACT ASSESSMENT,
New Mexico State Univ., University Park. Dept. of Agricultural Economics and Agricultural Business.
For primary bibliographic entry see Field 6G.
W78-00624

RESERVOIR YIELD: AN IMPORTANT ENVIRONMENTAL PARAMETER,
Illinois State Environmental Protection Agency, Springfield.
For primary bibliographic entry see Field 4A.
W78-00627

FEASIBILITY OF INTERBASIN WATER TRANSFER,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W78-00628

AN ARCHETYPAL LINEAR PROGRAMMING MODEL FOR OPTIMAL INTERTEMPORAL ALLOCATION OF GROUNDWATER TO AGRICULTURAL ACTIVITIES,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.

W78-00629

HEURISTIC ALGORITHM FOR WASTE-WATER PLANNING,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W78-00630

MODELS FOR OPTIMIZING THE MULTIPURPOSE OPERATION OF A RESERVOIR SYSTEM,
Texas Univ. at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 4A.
W78-00634

MULTIPURPOSE USE OF CATCHMENT MODELS FOR OPERATIONAL FORECASTING AND PLANNING STUDIES,
Institut fuer Wasserwirtschaft, Berlin (East Germany).
For primary bibliographic entry see Field 2A.
W78-00635

SOME WATER RESOURCE SYSTEM STUDIES IN THE UK,
Department of the Environment, Reading (England). Central Water Planning Unit.
For primary bibliographic entry see Field 4B.
W78-00636

HYDROLOGICAL SYSTEM RELIABILITY AT THE CONFLUENCE OF RIVERS,
Water Resources Centre, Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W78-00637

SIMULATION MODELS OF THE VELIKA MORAVA BASIN FOR DESIGN OF A MULTIPURPOSE RESERVOIR SYSTEM,
Institut za Vodoprivredu Jaroslav Cerni Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4A.
W78-00639

THE CALCULATION OF WATER SHORTAGE INDICES BY USING INFORMATION ABOUT THE CONCOMITANCE OF WATER RESOURCES AND DEMANDS,
Research Inst. for Water Resources Development. Budapest (Hungary).
For primary bibliographic entry see Field 6D.
W78-00640

CHANCE CONSTRAINED MODEL OF WATER RESOURCES SYSTEMS,
Water Resources Development and Construction, Prague (Czechoslovakia).
For primary bibliographic entry see Field 4A.
W78-00641

GENERAL MARKOV MODEL FOR OPTIMAL CONTROL RESERVOIRS,
Polish Academy of Sciences, Warsaw. Inst. of Geophysics.
For primary bibliographic entry see Field 4A.
W78-00642

A WORK-HELP FOR THE CALCULATION OF WATER RESTRICTION INDICES,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 6D.
W78-00643

DISCUSSION 'REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,' BY R.E. MARKLAND, ET AL.,
Meta Systems, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5E.
W78-00644

MULTIPLE OBJECTIVE OPTIMIZATION MODEL FOR REAL-TIME OPERATION OF A WATER SUPPLY SYSTEM,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 4A.
W78-00645

HIERARCHICAL MULTIPLE OBJECTIVE ANALYSIS OF LAND AND WATER RESOURCE UTILIZATION FOR A SYSTEM OF LAKES,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 4A.
W78-00646

LARGE WASTE TREATMENT SYSTEMS: DESIGN FOR BOTH EFFICIENCY AND INFLOW LEVEL OF EACH PROCESS,
McGill Univ., Montreal (Quebec). Dept. of Civil Engineering and Applied Mechanics.
For primary bibliographic entry see Field 5D.
W78-00647

MODELLING FOR WATER RESOURCE SYSTEMS PLANNING,
Cornell University, Ithaca, NY. Dept. of Environmental Engineering.
D. P. Loucks.
In: Large Engineering Systems: Proceedings of the International Symposium, University of Manitoba, Winnipeg, Canada, Aug. 9-12, 1976. Alvin Wexler (Ed.), Pergamon Press, Inc., Oxford, United Kingdom, p 589-595, 1977.

Descriptors: *Water resources, *Planning, *Mathematical models, Evaluation, Alternative planning, Water resources development, Multiple purpose, Methodology, Engineering, Management, Optimal development plans, Decision making, System analysis.
Identifiers: *Multiple objectives.

Considerable experience has been gained in the management of water quantity and quality. Present-day water resources planning involves not only multiple purposes and expertise from many different disciplines, but it also entails multiple objectives. Issues of equity and environmental quality may have as much importance as economic efficiency, no longer the primary goal of water resources development programs. The numerous planning objectives and the increased public involvement in the planning process have changed the manner in which engineers approach the task. Politicians and elected public officials have taken much of the responsibility for the decision making from the engineers. Today large water systems are studied with a greater awareness of their complexity. Modeling methodologies can define and evaluate alternatives which represent various compromises among conflicting management objectives; however, they cannot guarantee optimal plans. The success of any quantitative systems study is whether or not it has an impact in the planning and decision-making process. After introducing the problem, Loucks considers: defining and evaluating alternative plans; water resource systems studies and their use; some applications of water resource systems studies, focusing on studies done at Cornell University; the education of water resource systems analysts; and research needs or better systems planning. (Bell-Cornell)
W78-00648

AN URBAN MODEL FOR THE EVALUATION OF ALTERNATIVE GROWTH POLICIES,
Oklahoma Univ., Norman. Bureau of Water and Environmental Resources Research.
G. W. Reid, J. F. Lawrence, and S. S. Y. Law.
In: Large Engineering Systems: Proceedings of the International Symposium, University of Manitoba, Winnipeg, Canada, Aug. 9-12, 1976. Alvin Wexler (Ed.), Pergamon Press, Inc., Oxford, United Kingdom, p 610-624, 1977. 8 fig, 7 ref.

Descriptors: *Urbanization, Analytical techniques, *Mathematical models, *Planning, Human population, Land use, Air pollution, Transportation, Water supply, Sewerage, Solid wastes, Drainage, Decision making, Evaluation, Systems analysis.
Identifiers: *Urban growth policy, Housing, Submodels.

An urban model can be a very large and complex system representing many sectors of the urban environments. Herein, an urban model, which includes several components or sub-models of the urban system, is presented. These sub-models are in the areas of population, housing, land use, air pollution, transportation, water supply, sewerage, solid waste, and drainage. Various modeling or system analysis techniques were used in the development of these sub-models. Cohorts-survival and disaggregation techniques were used for the population model. Input-output matrix and double cohort-survival technique was used for the housing model. The land use model was a heuristic model, designated as a spatial structured model, usng Delphi and gaming techniques. The network system transportation model was based on a goal-directed/backward-seeking model system using mathematical programming. The water supply, sewerage, and solid waste models are multi-staged and multi-structured and mathematical programming was used here also. Regression analysis was used in the drainage model and correlation analysis in the air pollution model. These models provide planners or decision makers with a more systematic method for assistance in the evaluation of urban growth policies. (Bell-Cornell)
W78-00649

6B. Evaluation Process

EVALUATION OF ALTERNATIVE USES OF WETLANDS, (PART II),
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
T. Hertsgaard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 650, Price codes: A06 in paper copy, A01 in microfiche. North Dakota Water Resources Research Institute, Fargo, Completion Report, No. WI-221-035-76, May 1976. 115 p, 4 fig, 40 tab, 26 ref, 2 append. OWRT A-039-NDAK(2), 14-31-0001-4034.

Descriptors: *Wetlands, Crop response, Drainage, Waterfowl, *Benefits, *Costs, Value, *Evaluation, *North Dakota, Surveys, *Attitudes, *Hunting, Small game, Economic impact, Wildlife, Deer.
Identifiers: Stutsman County(N Dak).

Selected benefits and costs were evaluated of wetlands in cropland areas of North Dakota that accrue to farmers and other members of society. Estimates of these benefits and costs were based on data obtained from a mail survey of farmers and hunters. The state as a whole was the study area in collecting hunting expenditure data and Stutsman County was the study area in collecting drainage and crop depredation losses data. Three hunting activities were considered in estimating hunter expenditures. They were: waterfowl, small game and deer hunting. The average of reported expenditures for waterfowl, small game, and deer hunting in 1973 was $181.45, $89.49 and $159.34, respectively. The economic inpact of these

average expenditures was estimated by the application of input-output (interdependence) coefficients. It was estimated that hunter expenditures generate approximately $54.3 million of gross business volume in the state's economy. It was estimated that approximately 56 percent of this gross business volume can be attributed to the existence of wetlands. (See also W76-06900)
W78-00503

THE POTENTIAL IMPACT OF COAL-ENERGY DEVELOPMENT ON AGRICULTURE LAND RESOURCES IN WYOMING'S POWDER RIVER BASIN,
Wyoming Univ., Laramie. Water Resources Research Inst.
D. Janis, J. Carlson, and C. Phillips.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 607, Price codes: A04 in paper copy, A01 in microfiche. Project Completion Report, June 1977. 46 p, 19 tab, 1 fig, 3 maps. OWRT A-021-WYO(1), 14-34-0001-6053.

Descriptors: *Wyoming, Land use, Land development, *Economic impact, *Energy, Coal, Agriculture, Industrial production, Land resources, Projections, Forecasting.
Identifiers: *Powder River Basin(Wyo), *Coal-energy development, Development impacts.

The range of impacts that could occur to agriculture and the adjustments that might occur as land resources in Wyoming's Powder River Basin are shifted from agricultural production to coal-energy production are discussed. The impacts are analyzed in terms of acres of land withdrawn from agricultural production, the types of crops which would be on that land, and the economic loss to the Basin (in dollars of production lost) associated with the withdrawal of this agricultural production. Analysis of potential crop losses was made primarily by using remote-sensor data with follow-up cross-checking against land use maps, agriculture officials and field checks. Once the agricultural land was located, documented, and mapped, areas of existing and proposed coal-energy activity were overlaid on the agricultural maps. Areas of conflict between agriculture and coal-energy production were thus determined.
W78-00505

THE VIRGIN RIVER BASIN STUDY: A REGIONAL APPROACH TO MULTIOBJECTIVE PLANNING FOR WATER AND RELATED RESOURCES,
Nevada Univ. System, Reno. Water Resources Center.
J. E. Keith, J. Mulder, T. C. Hughes, V. A. Narasimhan, and L. Rovig.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 647, Price codes: A08 in paper copy, A01 in microfiche. Utah State University, Logan, Utah Water Research Laboratory, Report PRWG146-1, June 1977. 150 p, 16 fig, 45 tab, 4 append. OWRT B-084-NEV(1), 14-31-0001-5090.

Descriptors: Water resources, *Planning, *Regional analysis, Colorado River Basin, *Model studies, Nevada, Utah, Arizona, Attitudes, Optimization, Methodology, Political aspects, Institutional constraints.
Identifiers: *Multiobjective planning, *Virgin River Basin(Utah-Ariz-Nev), *Surrogate Worth Trade-off method, *PROPDEMM model, Social models.

Two multiobjective planning models were applied to the Virgin River Basin in order to test the efficiency and practicality of applying such tools in water resources planning. The Surrogate Worth Trade-Off (SWT) method couples mathematical optimization to quantify tradeoffs among noncommensurable objectives with interviews to compare public preferences with respect to these tradeoffs. PROPDEMM uses information on interest group objectives, values, willingness to pay, influence, level of information, etc. to compare the political feasibility of alternative courses of action. Both models were applied to assess the difficulties in doing so and the usefulness of the results. The tradeoffs identified by the SWT method showed agricultural water use to be so dominant in the basin that slight adjustments in irrigation efficiency could supply all foreseeable needs for additional water for other uses. PROPDEMM showed the politically most controversial tradeoff was between construction of energy generating facilities and life support for a rare species of minnow, a controversy that would probably be decided in favor of the environmentalists because of their power and non-openness to change. Improvements to the model to do a better job of interfacing environmental with social data were recommended. Social modeling in such low population areas was restricted by laws against disclosure of private information. (Fallon-Nevada)
W78-00551

A WATERSHED PLANNING AND MANAGEMENT SYSTEM: DESIGN AND SYNTHESIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Div. of Environmental and Urban Systems; and Virginia Polytechnic Inst. and State Univ., Blackburg. School of Forestry and Wildlife Resources.
For primary bibliographic entry see Field 4D.
W78-00560

INTEGRATING SOCIAL ANALYSIS INTO WATER RESOURCES PLANNING: SOME EMERGING TRENDS IN THE CORPS OF ENGINEERS,
Institute for Water Resources (Army), Fort Belvoir, VA.
J. D. Priscoli.
Water Resources Bulletin, Vol. 13, No. 5, p 953-958, October 1977. 10 ref.

Descriptors: *Water resources development, *Social impacts, *Water policy, Legislation, Regulation, *Planning, Social aspects.
Identifiers: *Social analysis, Social effects, Interdisciplinary planning, Data gathering.

While Federal water resources laws and regulations require social analysis, no one workable formula exists for integrating it into water resources planning. Two primary problems in integrating social analysis into planning are examined: making trade-offs between policy acceptability and theoretical competence, and managing social analysis in planning. For illustration, the article builds on emerging trends within the U.S. Army Corps of Engineers. It concludes by observing that creative application of social theory to policy problems along with innovative data gathering techniques are the primary routes to managing these problems. (Bell-Cornell)
W78-00625

HEURISTIC ALGORITHM FOR WASTEWATER PLANNING,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W78-00630

MODELLING FOR WATER RESOURCE SYSTEMS PLANNING,
Cornell University, Ithaca, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6A.
W78-00648

OMNIBUS WATER RESOURCES DEVELOPMENT ACT OF 1976.
For primary bibliographic entry see Field 6E.
W78-00650

SUCCESS STORIES IN MULTIPLE USE,
Bureau of Outdoor Recreation, Ann Arbor, MI. Lake Central Region Office.
T. L. Gilbert.
Parks and Recreation, Vol. 12, No. 2, p. 22a-27a, February 1977.

Descriptors: *Recreation facilities, Waste water treatment, Water pollution treatment, *Sewage treatment, *Coordination, Recreation waste, Federal Water Pollution Control Act, Parks, Management, Resources, Project planning, Optimum development plans, Multiple purpose, Disposal, Farms, Recreation, Environment, Environmental effects, Land reclamation, Sludge treatment, Sludge disposal, Waste disposal, Treatment facilities.
Identifiers: Environmental Protection Agency, Environmental policy, Federal Water Pollution Control Act Amendments of 1972.

Many recreational opportunities are afforded to communities through construction of wastewater treatment facilities and sewage treatment plants. The Bureau of Outdoor Recreation and the Environmental Protection Agency have joined in efforts to encourage the combination of open space and recreational considerations with waste treatment management. These efforts have resulted in coordinated recreation and water quality programs which provide opportunities for obtaining recreational benefits from water cleanup schemes. Such benefits include environmental awareness centers, neighborhood parks, playgrounds, wildlife reserves, and irrigation of large farming areas. Examples are given of communities which have coordinated their recreation and water quality programs. These include Franklin, Ohio; Miamisburg, Ohio; Napierville, Illinois; Muskegon County, Michigan; Cook County, Illinois; Fulton County, Illinois; and Bellevue, Washington. The author urges multiple-use of existing water pollution control facilities and the reclamation of abandoned facilities for recreational purposes. The park and recreation profession should support water pollution control programs since clean water and outdoor recreation go hand-in-hand. (Howard-Florida)
W78-00660

EMERGING TECHNOLOGY AND ADMINISTRATIVE ORGANIZATION FOR WATER DEVELOPMENT,
For primary bibliographic entry see Field 6E.
W78-00661

LAND DRAINAGE IN ENGLAND AND WALES,
Ministry of Agriculture, Fisheries and Food, London (England).
For primary bibliographic entry see Field 4A.
W78-00691

NEW ENGLAND RIVER BASINS COMMISSION FINDINGS AND RECOMMENDATIONS ON THE CONNECTICUT RIVER BASIN COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION.
New England River Basins Commission, Boston, MA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-237 263, Price codes: A09 in paper copy, A01 in microfiche. Final Report, January 1, 1972, 145 p.

Descriptors: *Watershed management, *River basin development, *Planning, *Water resources development, *Water management(Applied), Land management, Water quality, Powerplants, Recreation, Flood protection, Water supply, Anadromous fish, Costs, Economic impact.
Identifiers: *Connecticut River Basin, *Flood plain management, *Resource management, New England River Basins Commission.

A federal-state Coordinating Committee studied means of meeting water and related land resource management needs of the Connecticut River Basin to 1980 and 2020. The New England River Basin Commission (NERBC) 1980 basin plan, based on a review of the coordinating committee report, contains a five-part proposal for supplemental environmental and basin flood management studies and presents findings and recommendations on water quality, power, outdoor recreation, preservation of sites, anadromous fisheries restoration, resident fish and wildlife, water supply, navigation, upstream watershed management, flood control, and plan implementation, costs and priorities. Comments by interested parties on the Coordinating Committee and draft NERBC reports are summarized. The plan's goal is the development of natural resouces in the basin to meet economic and environmental needs, including the need for jobs, housing, protection from natural catastrophes, and other human essentials, where development is reconcilable with preservation and enhancement of the Basin environment. The premise that the Basin's environmental quality is its primary economic asset underlies every recommendation for resource development. Implementation of the plan requires sound management of population and economic growth throughout New England to provide balanced distribution of demands upon natural resources in accordance with their character and availability. (Nessa-NC)
W78-00746

INTERIM GUIDE FOR ENVIRONMENTAL ASSESSMENT: HUD FIELD OFFICE EDITION.
Voorhees (Alan M.) and Associates, Inc., McLean, VA.
For primary bibliographic entry see Field 6G.
W78-00749

AN ASSESSMENT METHODOLOGY FOR THE ENVIRONMENTAL IMPACT OF WATER RESOURCE PROJECTS,
Battelle Columbus Labs., OH.
For primary bibliographic entry see Field 6G.
W78-00750

IMPLEMENTATION PLAN FOR THE COST OF A CLEAN ENVIRONMENT REPORT.
Control Data Corp., Rockville, MD. Professional Services Div.
For primary bibliographic entry see Field 5G.
W78-00772

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE IMPACT OF WATER SAVING DEVICE INSTALLATION PROGRAMS ON RESOURCE CONSERVATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 3D.
W78-00563

A MODEL FOR ACHIEVING CONSISTENCY FOR COST SHARING IN WATER RESOURCE PROGRAMS,
Georgia Univ., Athens. Inst. of Natural Resources.
R. M. North, and W. P. Neely.
Water Resources Bulletin, Vol. 13, No. 5, p 995-1005, October 1977. 1 tab, 12 ref.

Descriptors: *Water resources, *Water policy, *Cost sharing, *Cost allocation, *Economic efficiency, *Federal project policy, Programs, Computer models, Equations, Operation and maintenance, Costs, Systems analysis.
Identifiers: User charges, Reimbursement.

Three basic principles of responsibility have influenced the Federal/non-Federal cost sharing rates for water resources programs: (1) full payment by benefiaries; (2) exclusive Federal assumption of costs; and (3) joint Federal/non-Federal sharing. The efforts to determine appropriate cost sharing rates have resulted in several hundred complex arrangements involving contributions, user charges and direct sales based on many variations of payment terms. This is expressed in a basic present value model developed to determine the non-Federal water resources programs and projects for both implementation and OMR stages. The model introduces the concept of a composite (implementation plus OMR) cost share as a focus for developing appropriate resources investments. The model can be used as a focus for policy decisions on cost sharing which seek to achieve consistent and equitable cost shares for purposes provided while maintaining an efficient allocation of resources within water programs. (Bell-Cornell)
W78-00626

FEASIBILITY OF INTERBASIN WATER TRANSFER,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W78-00628

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME IV-APPENDICES,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 6G.
W78-00756

IMPLEMENTATION PLAN FOR THE COST OF A CLEAN ENVIRONMENT REPORT.
Control Data Corp., Rockville, MD. Professional Services Div.
For primary bibliographic entry see Field 5G.
W78-00772

6D. Water Demand

THE CALCULATION OF WATER SHORTAGE INDICES BY USING INFORMATION ABOUT THE CONCOMITANCE OF WATER RESOURCES AND DEMANDS,
Research Inst. for Water Resources Development. Budapest (Hungary).
M. Domokos, J. Weber, and M. M. Fogel.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, International Association of Hydrological Sciences, 1975, p 94-103. 5 fig, 7 ref.

Descriptors: *Water resources, *Water demand, *Water shortage, Economics, Value, Relaibility, Probability, Methodology, Stochastic processes, Equations.
Identifiers: *Concomitance.

One of the simple ways of aiding water resources management decisions is to calculate the actual or expected values of so-called water shortage indices (measures of shortfall or deficit in satisfying water demand) and to compare them with their limit values prescribed on the basis of economic considerations. Methods have been known for the calculation of water shortage indices in the case of constant water demand. Presented are new methods for their calculations under less special conditions, that is, when the relationship between water resources and demands has either a stochastic or deterministic character. The main conditions for the large-scale practical use of the proposed methods are the extension and higher reliability of water consumption data and the economic establishment of tolerated limit values of water shortage indices. (See also W77-10419) (Bell-Cornell)
W78-00640

A WORK-HELP FOR THE CALCULATION OF WATER RESTRICTION INDICES,
Research Inst. for Water Resources Development, Budapest (Hungary).
J. Tokar.
In: Application of Mathematical Models in Hydrology and Water Resources Systems, Proceedings of the Bratislava Symposium, Czechoslovakia, September 1975. IAHS-AISH Publication No. 115, p 238-246, 1975.

Descriptors: *Rivers, *Measurement, *Water shortage, *Water demand, *Water resources, Probability, Analytical techniques, Discharge(Water), Hydrology, Equations, Systems analysis.
Identifiers: *Water restriction index, Calculation, Hungary, Approximation method.

A calculation work-help is proposed to facilitate the measurement of the average relative water shortage index, which is a quotient of the water demand in the period under consideration and of the total water demand. To determine such work-helps, the fact that the water restriction index can be defined by the area below the discharge distribution function is considered. From the investigations made, 14 discharge registration sections with long and reliable records have been chosen. Used as basic data are discharge values, generated from several years of daily data for the month under consideration by ranging them into discharge intervals. For each of the 14 sections and for each month of the reference year, the so-called equalizing functions have been generated, yielding so-called group-universal functions. An example of a practical application to a river in Hungary is given. (See also W77-10419) (Bell-Cornell)
W78-00643

THE ROLE OF STATE LEGISLATION IN GROUND WATER MANAGEMENT,
Arizona Univ., Tucson. School of Law.
For primary bibliographic entry see Field 4B.
W78-00658

6E. Water Law and Institutions

A COMPARISON OF INTERORGANIZATIONAL RELATIONSHIPS WITHIN TWO CONTIGUOUS WATERSHED DISTRICTS,
Mississippi State Univ., Mississippi State. Dept. of Sociology.
G. D. Hampe.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 763, Price codes: A04 in paper copy, A01 in microfiche. Mississippi State University, Water Resources Research Institute, Completion Report, September 1977. 53 p, 4 fig, 4 tab, 5 ref. OWRT A-101-MISS(1), 14-34-0001-7052.

Descriptors: Watershed management, River basin development, *Institutions, *Water districts, *Mississippi, *Organizations, History, Political aspects.
Identifiers: *Watershed districts(Miss).

A case analysis of the history, growth and organizational structure was made of the Pearl River Basin Development District and the Pat Harrison Waterway District in Mississippi. Interorganizational differences in the type of organizations with which the watershed district had contact and the frequency of that contact were both related directly to the particular history of the district, its political structure and the needs and long-range-

goals of the district. It was concluded that when a watershed district, just like any other public organization, is directly responsible to its constituency and is relatively stable over time in terms of personnel, the workings of that district are more efficient, less conflict engendering and generally more accessible to the public.
W78-00559

INTEGRATING SOCIAL ANALYSIS INTO WATER RESOURCES PLANNING: SOME EMERGING TRENDS IN THE CORPS OF ENGINEERS,
Institute for Water Resources (Army), Fort Belvoir, VA.
For primary bibliographic entry see Field 6B.
W78-00625

OMNIBUS WATER RESOURCES DEVELOPMENT ACT OF 1976.
Hearings--Subcomm. on Water Resources--Comm. on Public Works, US Senate, April-August, 1976. Serial No 94-H38. 2267 p.

Descriptors: *Water resources development, *Legislation, *Flood control, *Hydroelectric plants, Structures, Subsidence, Damages, Water control, Dams, Hydraulic structures, Hydrologic data, Water management(Applied), Conservation, Engineering, Legal aspects, Water law, Project feasibility, Cost-benefit ratio.
Identifiers: *Coastal Zone Management Act of 1972, *Congressional hearings, Class action suits, Federal Water Pollution Control Act Amendments of 1972, Navigability, Dam effects, Property interests.

Hearings were held dealing with pending water resources legislation and related matters. Approximately 36 pieces of legislation involving as many states, including Puerto Rico, were discussed and debated by public representatives, private citizens, businessmen, and other interested parties. One series of hearings was devoted to testimony from the Corps of Engineers on projects in various stages of approval, according to geographical area. The projects discussed ranged from expanding navigation facilities on the Ohio River to authorizing power plants on the Columbia River. The most frequently recurring concern, however, was that of controlling the increased urban flooding being caused by the urbanization processes in out cities. Pictures of such flooding in many areas are included. (Jones-Florida)
W78-00650

LEGAL CRITICAL FACTOR ANALYSIS (IN COMPLIANCE WITH THE AREA-WIDE WASTE TREATMENT MANAGEMENT PLANNING PROGRAM).
Miami Valley Regional Planning Commission, Dayton, OH.
For primary bibliographic entry see Field 5G.
W78-00651

WATER QUALITY AND EFFLUENT STANDARDS OF HAWAII,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-00652

EFFECTS OF NEPA'S REVIEW AND COMMENT PROCESS ON WATER RESOURCE PLANNING (SURVEY RESULTS),
Stanford Univ., Calif. Dept. of Engineering.
For primary bibliographic entry see Field 6G.
W78-00654

HOW WILL SMALL UTILITIES COMPLY WITH THE SAFE DRINKING WATER ACT,
Washington State Dept. of Social and Health Services, Olympia.
For primary bibliographic entry see Field 5G.
W78-00655

REGULATIONS: REACTIONS AND RESOLUTION.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00656

COASTAL ZONE LEGAL REFERENCES, 1976.
State Univ. of New York at Buffalo, Amherst. Sea Grant Law Center.
Published by New York Sea Grant Institute, State University of New York, Albany, 382 p. September 1976.

Descriptors: *Bibliographies, *Judicial decisions, *Coasts, Libraries, Reviews, Documentation, Information exchange, Data collections, Surveys, Regulation, Indexing, Water law, Legislation, Zoning, Land tenure, Wetlands, Exploitation, Land development, Shores, Pollution.
Identifiers: *Coastal zones, *Coastal zone management, Coastal waters, Marine ecosystem, Marine environment, Marine resources, Minerals.

The legal literature surveyed for this working bibliography is organized under broad categories of the coastal zone. Components of the coastal zone are divided into the general area of coastal zone resources and specific elements such as wetlands, tidelands, estuaries, marches, submerged lands and beaches. References on competing interests in coastal zone development are subdivided into sections on exploitation of mineral and living resources and on shoreline and waterway use and development. Materials covering the impact of development on coastal zone dynamics are included in sections on natural shoreline dynamics and on a variety of pollution sources. Methods, objectives and underlying policies of federal, state, and local regulatory power in the coastal zone are the focus of a fourth category. Publications on procedural and constitutional issues are also listed. Within each category references are organized under the general heading as well as under related Federal and state cases and legislation. General materials on coastal zone states complete the bibliography. (Mulligan-Florida)
W78-00657

THE ROLE OF STATE LEGISLATION IN GROUND WATER MANAGEMENT,
Arizona Univ., Tucson. School of Law.
For primary bibliographic entry see Field 4B.
W78-00658

THE EFFECTS OF THE 200 MILE UNITED STATES FISHING ZONE,
S. W. Hays.
Louisiana Law Review, Vol 37, No 4, p 852-74, Spring 1977.

Descriptors: *Regulation, *Fish conservation, *Fish, *Commercial fishing, *Oceans, Fisheries, Administration, Anadromous fish, Commercial fish, Fish management, Permits, Migration, Fish migration, Movement, Migration patterns, Law of the Sea, Technology, Economic impact, Treaties, Foreign countries, Jurisdiction, Boats, Legislation.
Identifiers: *Territorial seas(Jurisdiction), *Territorial waters, *Coastal waters, *Outer Continental Shelf, Law of the Sea Conference, International agreements, Administrative regulations, 200-mile zone, Exclusive economic zone, Tuna.

Increased consumer demand and new technological developments, such as processing and freezing at sea, improved synthetic webbing in net fishing, and new frozen fish products have created the need for fisheries conservation. Four United Nations Law of the Sea Conferences have failed to decide the breadth of the territorial sea and the interests of coastal states in the fishery resources off their coasts. To hasten negotiations the Fourth Conference adopted a negotiating text which advocated a 200-mile exclusive economic zone. Recognizing that any fishery management treaty would provide some type of economic zone. Congress passed the Fishery Conservation and Management Act which established a 200-mile fishery conservation zone around the United States. Foreign nations began enacting their own 200-mile zones, implicitly ratifying the United States' action. The author assesses the impact of the Act on the anadromous sedentary and highly migratory fish species, and on the coastal fishing industry and the Gulf Coast fishing industry. The act finally provides the United States with a statutory basis from which to develop and enforce a unified fishery management plan. (Kastner-Florida)
W78-00659

SUCCESS STORIES IN MULTIPLE USE,
Bureau of Outdoor Recreation, Ann Arbor, MI. Lake Central Region Office.
For primary bibliographic entry see Field 6B.
W78-00660

EMERGING TECHNOLOGY AND ADMINISTRATIVE ORGANIZATION FOR WATER DEVELOPMENT,
E. A. Ackerman, and G. O. Lof.
In: Technology in American Water Development, p. 628-57, Johns Hopkins Press, Baltimore, Md. 1959.

Descriptors: *Water management(Applied), *Water resources development, *Administrative agencies, *Water utilization, *Technology, Weather modification, Evaporation control, Water transfer, Tennessee Valley Authority, Desalination, Aquifers, Federal government, Saline water, Water distribution(Applied), Water allocation(Policy), Groundwater resources, Water supply development, Water control, Water sources, Water storage.
Identifiers: *Administrative regulations, Multiple resource management, Groundwater management.

Administrative means are needed for using new technology in a co-ordinated manner to aid in efficient water resources development and management. The authors strongly urge creation of regional administrative units which would be co-ordinated where necessary by an overriding national body. The most appropriate technical aids will differ from region to region. Among those discussed are: (1) weather modification; (2) desalting; (3) reuse of industrial and municipal water; (4) evaporation control; (5) water transfer; and (6) mining ground water. Numerous administrative problems that have resulted from increased technology are explored, but the most pressing is the need for co-ordination and centralization of water management among federal, state, local, and private sectors. Co-ordination is essential because of: (1) the increasing differentiation of water problems among the regions; (2) the need for different techniques among the regions; and (3) the eminent feasibility of administering water development on a regional basis. In addition, the federal establishment may be a better technical leader if it is less of an entrepreneur. By having both national and regional agencies, the most appropriate body is able to handle a particular management problem as it occurs. (Quarles-Florida)
W78-00661

CONGRESS RECEIVES COMPREHENSIVE GROUND WATER REPORT.
For primary bibliographic entry see Field 4B.
W78-00662

WESTWIDE STUDY (CRITICAL WATER PROBLEMS FACING THE ELEVEN WESTERN STATES).
Bureau of Reclamation, Washington, DC.
For primary bibliographic entry see Field 4A.
W78-00663

COALITION FOR LOWER BEAUFORT COUNTY V. ALEXANDER (COASTAL CONSTRUCTION PERMITS AND THE NATIONAL ENVIRONMENTAL POLICY ACT).
434 F. Supp. 293-96 (D.C. 1977).

Descriptors: *Permits, *Piers, *Environmental effects, *Economic impact, Coastal engineering, South Carolina, Economic justification, Economic feasibility, Ecological distribution, Coasts, Pollution abatement, Water pollution, Legislation, Employment, Employment opportunities, Administrative decisions, Structures.
Identifiers: *National Environmental Policy Act, *Deep water ports, Environmental impact statements, Citizen suits.

The plaintiffs, an association of local residents, sought to set aside a pier construction permit granted by the Secretary of the Army at the instance of the Corps of Engineers. Envisioning injury to endangered species, ecological integrity, and the pleasures of simple coastal living, the residents claimed the defendant had failed to comply with the National Environmental Policy Act. The State of South Carolina stressed the necessity for limited development of the area as a deep water industrial port to improve its employment and economy. The permit applicant has established a buffer zone around its plant to help preserve the ecology. In addition, the plant will be free from air and water pollution. The United States District Court found no procedural irregularities with only a technical deviation in procedure. Stating that there were no concrete indications of secondary ramifications, the rejection of an alternative site was nonarbitrary and all relevant environmental factors had been continuously and meticulously considered, the court held that no violation of the Act had been shown. (Steger-Florida)
W78-00664

PERMITS FOR DIVERSION, TRANSFER, APPROPRIATION OF WATER FROM INTERSTATE STREAMS; STORED WATER; WASTE WATER.
Nev. Rev. Stat. secs 533.515 thru 533.540.

Descriptors: *Nevada, *Legislation, *Interstate rivers, *Diversion, *Water permits, Alteration of flow, Irrigation practices, Relative rights, Water utilization, State governments, Water law, Governments, Water resources development, Equitable apportionment, Permits, Reservoirs, Beneficial use, Water districts, Water policy.
Identifiers: Licenses, State policy.

A permit for water appropriation may be granted in Nevada when the point of diversion lies outside the state if the other state authorizes the diversion of its water for use in Nevada. No permit will be issued to change the use or to transfer water or water rights of any water appropriated for beneficial use in Nevada for use beyond the state borders. Waters from interstate streams may be diverted within Nevada for beneficial use in another state only when state has a reciprocal water diversion agreement. It is a misdemeanor to divert and not use or to waste water of any river, stream, or creek during the irrigation season. Lake Tahoe may be used by the United States for reservoir purposes to aid the Truckee-Carson reclamation project. Guidelines and procedures are provided for the refunding of water district funds from county treasuries to water users and calimants of rights to waters of the Carson River or its forks. (Mulligan-Florida)
W78-00665

USE OF WATER FOR WATERING LIVESTOCK.
Nev. Rev. Stat. secs 533.485 thru 533.510 (1975).

Descriptors: *Nevada, *Legislation, *Stock water, *Livestock, *Ranges, Cattle, Farm management, Farms, Beneficial use, Farm ponds, Water utilization, Natural use, Water allocation(Policy), Water consumption(Except consumptive use), Water supply, Range management, Legal aspects, Preferences(Water rights), Permits, Water control, Water requirements, Prior appropriation.
Identifiers: State policy.

All lands in Nevada on which livestock are permitted to graze constitute the public range; livestock which subsist mainly by grazing on the public range are called range livestock. The use of water for watering livestock is declared a beneficial use; rights to use water for livestock may be acquired by application to the state engineer stating the number and kind on animals to be watered. If one person has a subsisting right to water range livestock at a particular place, no further appropriation of water from that place will be granted when it interferes with the grazing use of that portion of the public range. Furthermore, the state engineer may reject an application if the water source lies along an established route for moving livestock, and the state engineer determines that the public interest will best be served by reserving the water for livestock being driven. It is unlawful to water more than 50 head of livestock on two or more separate days, or within three miles of, a watering place at which another person has a subsisting right to water more than 50 livestock. (Mulligan-Florida)
W78-00666

RESERVOIRS.
Nev. Rev. Stat. secs 533.440 thru 533.445 (1975).

Descriptors: *Nevada, *Legislation, *Reservoirs, *Water permits, Reservoir operation, Routing, Supply, Underground storage, Water sources, Water supply, Beneficial use, Retention, Permits, Water control, Regulation, Reservoir storage, Water storage, Water management(Applied), Water reuse.
Identifiers: *Groundwater management, *Reservoir permits, Licenses.

Persons in Nevada applying for reservoir permits who propose to apply the stored water to a beneficial use must apply for a permit known as a secondary permit. The application must show that an agreement has been reached with the reservoir owner to impound sufficient water for the purpose stated. Effluents discharged from sewage treatment systems after final treatment are considered water subject to appropriation for beneficial use under the secondary permit program. When the beneficial use has been completed and proof thereof submitted, a final certificate of appropriation will be issued. If a reservoir owner desires to use a stream bed or other watercourse to carry water to consumers, he must give written notification to the state engineer and district water commissioner of the proposed date of discharge from the reservoir, its volume and the names of persons and ditches entitled to its use. The state engineer regulates the headgates of ditches not entitled to such use. The reservoir owner must reimburse the state for the time spent by the state engineer on these duties. (Mulligan-Florida)
W78-00667

CAPTAIN SOMA BOAT LINE V. CITY OF WISCONSIN DELLS (REASONABLE OBSTRUCTIONS TO NAVIGABLE STREAMS).
255 N.W. 441-46 (Wis. 1977).

Descriptors: *Wisconsin, *Bridges, *Boats, *Navigable waters, Financial feasibility, Recreation facilities, Riparian rights, Riparian land, Legal aspects, Navigation, Relative rights, Water law, Barriers, Structures, Boat-launching ramps, Marinas, High water mark, Cities, Streams, Economic impact.
Identifiers: *Nuisance(Legal aspects), Injunctive relief, Liability.

Plaintiff riparian landowner brought action against defendant city to abate a nuisance. The plaintiff contended that the defendant had obstructed a navigable stream by the maintenance of a highway bridge. The plaintiff operates boat tours and his only access to points of interest is through a small stream over which the disputed bridge runs. The city acknowledged that the bridge is an obstruction but contended that it was necessary and reasonable under the circumstances. Affirming the trial court's dismissal of the complaint, the Wisconsin Supreme Court noted that municipalities have the delegated powers to construct and maintain bridges. The court found that the bridge was necessary; the opening under the bridge was large enough at the time it was constructed; the plaintiff knew of the bridge's limitation prior to purchasing his land and tour operation; the city provided a floating dock on the river side free of charge; and the city had explored the possibility of building a new bridge but found the cost prohibitive. Under these circumstances, the court held that the city did not act unreasonably and would not be required to abate the nuisance even if it was one. (Curran-Florida)
W78-00668

UNITED STATES V. BOWEN (INTENT REQUIREMENT FOR PROSECUTION UNDER 1899 RIVERS AND HARBORS ACT).
428 F. Supp. 754-57 (D. Md. 1976).

Descriptors: *Rivers and Harbors Act, *Navigable waters, *Penalties(Legal), *Piers, *Permits, Constitutional law, Legislation, Legal aspects, Navigation, Regulation, Common law, Negligence, Judicial decisions, Water law, Bulkheads, Navigable rivers, Piles(Foundations), Structures.
Identifiers: Evidence, *Navigation obstructions, Property interests.

The federal government charged the defendant with two violations of the 1899 Rivers and Harbors Act which prohibits unauthorized obstructions to the navigable waters of the United States. The defendant had constructed a bulkhead, pier extensions, catwalk and mooring piles into navigable waterways. The defendant claimed that in order to convict him under the Act the government must prove that he had deliberately intended to obstruct the navigable waters. The government argued that the Act does not contain any reference to the element of intent. The United States District Court held that proof of the specific intent to obstruct was not necessary to convict. The court said it was sufficient to prove that the defendant intentionally built the structures which did in fact obstruct the navigable waters. The court fount that since the Act omitted mention of intent, the penalties for violation of the Act were minimal, conviction would not injure the defendant's reputation, and the statutory crime was not brought over from the common law, the statue could be construed as not requiring criminal intent. (Curran-Florida)
W78-00669

FARRUGIA V. FREDERICK (DENIAL OF CANAL PERMIT BASED ON ADVERSE EFFECTS UPON WATER QUALITY).
344 So2d 921-23 (Fla.App.1977).

Descriptors: *Florida, *Canal construction, *Water quality, *Permits, *Environmental control, Gases, Weeds, Environmental effects, Fish establishment, Basins, Boating, Channels, Odor, Construction, Compensation, Water law, Legal aspects, Judicial decisions.
Identifiers: *Environmental policy, Administrative decisions, State policy.

Petitioner was a developer of land located on Vaca Key seeking a permit to construct a proposed boat basin and access channel and to excavate a canal. The state agencies involved recommended denial of the permits. A hearing examiner appointed in the matter recommended denial only of the basin and channel permits based on evidence that the dead-end upland canal and its construction process would have an adverse effect on water quality. These findings were upheld by the full environmental commission. The First District Court of Appeals of Florida affirmed the permit denial finding that the waters in the canal would lack oxygen thus acquiring a foul odor from the accumulation of noxious gases, and that fish life could not exist in those conditions. Moreover, the ill effects could possibly be spread from the canal to outside waters. The court further found that denial of the canal permits would not deprive petitioner of his property but merely restrict the profit he could make on it. (Jones-Florida)
W78-00670

SIERRA CLUB V. MORTON (REQUIREMENTS OF FINAL ENVIRONMENTAL IMPACT STATEMENTS FOR DAM PROJECTS).
431 F.Supp. 11-25 (S.D. Tex. 1975).

Descriptors: *Texas, *Water structure, *Dams, *Dam construction, *Reservoir construction, Federal project policy, Environment, Environmental effects, River basin development, Cost-benefit analysis, Cost-benefit theory, Cost-benefit ratio, Environmental engineering, Reservoirs, Reservoir sites, River regulation, Estuaries, Estuarine environment, Wildlife conservation, Fish conservation, Legal aspects, River systems.
Identifiers: *National Environmental Policy Act, *Environmental impact statement, Archaeological impact, Legal requirements.

Plaintiffs, a national conservation organization, a citizens' association and an affected landowner sought to enjoin governmental officials and agencies from further development of a Texas dam and reservoir construction project. The plaintiffs alleged that the final environmental impact statement (FEIS) failed to comply with the requirements of the National Environmental Policy Act (NEPA). The United States District Court denied injunctive relief holding that the FEIS was sufficient even though it did not cover all relevant contingencies. It did adequately cover such areas as alternative water sources to the project; impact on riverine and estuarine systems during operation of the dam; damage to fish and wildlife and mitigation measures; preservation techniques for historical archaeological sites; and problems associated with recreation management. The court further found that a cost/benefit ratio analysis was unnecessary and that the FEIS was in compliance with the requirements of NEPA. The court held that it would not examine the substantive aspects of the project but only whether the NEPA procedures had been met. (Denker-Florida)
W78-00671

WATER AND LAND DEVELOPMENT--WELLS.
Hawaii Rev. Stat. secs 178-1 thru -11 (Supp 1975).

Descriptors: *Hawaii, *Wells, *Well regulations, *Aquifers, *Water conservation, Runoff, Water wells, Drainage wells, Casings, Drilling, Excavation, Well casings, Legal aspects, Regulation, Water law, Logging(Recording), Beneficial use, Porous media, Subsurface runoff, Surface runoff, Legislation.
Identifiers: Nuisance(Legal aspects).

A well, which has been legislatively defined as any excavation constructed into the ground or penetrating an aquifer or basin whether or not intended for acquisition or disposal of any liquid, shall be capped and equipped so as to prevent waste. A well not so equipped through which water flows to the surface into a porous stratum by natural pressure is declared a common nuisance. The owner or occupant of the land on which such a well is located is guilty of a misdemeanor if such a nuisance is allowed to continue. Beneficial use, to the extent allowed by the board of land and natural resources, is not considered 'waste' which is defined as causing or permitting water in any well to reach a porous substratum or to flow upon the land, into a natural watercourse, or onto any road. A notice shall be filed prior to the drilling of any new well and detailed records kept during its construction. In addition, the well shall be kept accessible for inspection. Such inspection is authorized without a warrant. Any well owner may relieve himself of responsibility for possible waste by transferring to the county the exclusive right to develop water on his property. (Moorhouse-Florida)
W78-00672

NETTLETON V. HIGGINSON (CONSTITUTIONALITY OF WATER DISTRIBUTION PRIORITIES IN TIMES OF SCARCITY).
558 p.2d 1048-63 (Idaho Sup. Ct. 1977).

Descriptors: *Idaho, *Preference(Water rights), *Appropriation, *Water districts, Water shortage, Beneficial use, Diversion, Legislation, Permits, Priorities, Unappropriated water, Natural streams, Eminent domain, Compensation, Water law, Legal aspects, Constitutional law, Water rights, Water allocation(Policy).

The plaintiff was the owner of property located in an upper stream water district, and held water rights therein created by the diversion of unappropriated waters for beneficial use. These rights were unadjudicated 'constitutional use' rights. The defendant Department of Water Resources, which controlled distribution of all waters of both the upper and lower stream, ordered its watermaster to distribute the waters from the stream as if the two districts were one. This action resulted in priority, in times of scarcity, to certain landowners in the lower district whose rights had already been adjudicated. In his suit, the plaintiff contended that: (1) the action constituted a taking without due process; (2) it was a denial of equal protection; and (3) just compensation was due from the taking of property for public use. The Idaho Supreme Court rejected these grounds holding that, for purposes of water administration in times of scarcity, a proper delivery can only be effected when the watermaster is guided by a specific schedule of water users and their priorities. The court then reversed the lower court and ordered the department to hold hearings on consolidation of the two water districts. (Jones-Florida)
W78-00673

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION V. INTAKE WATER COMPANY (INCHOATE RIGHT TO APPROPRIATE WATER DESPITE DELAY OF ACTUAL CONSTRUCTION).
558 P.2d 1110-23 (Mont. Sup. Ct. 1977).

Descriptors: *Montana, *Prior appropriation, *Water rights, *Diversion structures, Administrative decisions, Administrative agencies, Appropriation, Beneficial use, Preferences(Water rights), Priorities, Land reclamation, Coal mines, Wildlife conservation, Water works, Water utilization, Pumping, Reservoirs, Water demand, Water law, Judicial decisions, Legal aspects.
Identifiers: *Environmental impact statement, *Declaratory judgment.

Plaintiff department of natural resources sought a declaratory judgment that defendant water company did not have a valid appropriation of waters of the Yellowstone River. The subject matter of litigation was a multi-million dollar corporation project involving construction of a diversion facility to pump appropriated water from the river to storage reservoirs for distribution by pipelines to the service area. Following the required posting of notice of appropriation, the defendant engaged in environmental studies, legal and administrative work, and planning for the diversion works. The department claimed that the defendant did not own any rights because actual construction of the project was not commenced within forty days of posting notice. The Supreme Court of Montana held actual construction need not have begun where there had been a diligent effort to prosecute construction of the project. The court found that defendant corporation was the owner of an 'existing right' of priority of appropriation which would ripen into a valid appropriation when all statutory requirements were met. The court also rejected the department's argument that the defendant could not claim an inchoate right to appropriate for public policy reasons. (Jones-Florida)
W78-00674

STATE LEGISLATIVE RESPONSE TO THE CENTRAL ARIZONA PROJECT,
Georgia Univ., Athens.
V. L. Marando, and R. D. Thomas.
Water Resources Bulletin, Vol. 8, No. 6, p 1211-1218, December 1972. 2 tab, 11 ref. OWRT A-021-ARIZ(1).

Descriptors: *Water management(Applied), *Political aspects, *Water policy, *Legal aspects, *Arizona, State governments, Decision making, Projects, Environment, Legislation.
Identifiers: *Central Arizona Project.

This research deals with the manner in which Arizona Legislature handled the issue of the Central Arizona Project. Due to the massive costs and impact, the Central Arizona Project was dealt with by the Legislature in a nonroutinized manner. There was no Legislative precedent for handling such a major public work project. Given the Legislature's annual program concerns and priorities, it is neither structurally nor psychologically geared to respond to the Central Arizona Project in terms of placing it within an agenda of priorities even for discussion. (Bell-Cornell)
W78-00707

THE NATIONAL FLOOD INSURANCE PROGRAM: SOME MIDSTREAM PERSPECTIVES,
Massachusetts Univ., Amherst. Dept. of Geography; and Massachusetts Univ., Amherst. Dept. of Law.
For primary bibliographic entry see Field 6F.
W78-00747

INTERIM GUIDE FOR ENVIRONMENTAL ASSESSMENT: HUD FIELD OFFICE EDITION.
Voorhees (Alan M.) and Associates, Inc., McLean, VA.
For primary bibliographic entry see Field 6G.
W78-00749

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME III-PRELIMINARY POLICY ANALYSIS,
Oklahoma Univ., Norman. Science and Public Policy Program.
For primary bibliographic entry see Field 6G.
W78-00755

COASTAL ZONE MANAGEMENT PROGRAM DEVELOPMENT GRANTS.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 2L.
W78-00777

FOUR MONOGRAPHS FOR THE GENERAL READER (WORLD OCEANS, LAW OF THE OCEANS, INSTITUTIONAL ARRANGEMENTS FOR THE LAW OF THE SEA, WORK OF THE THIRD UNITED NATIONS LAW OF THE SEA),
Miami Univ., FL. School of Law.
T. A. Clingan, Jr.
Sea Grant Special Report No. 10, February, 1977. 67 p, $3.00.

Descriptors: *Continental shelf, *International commission, *International law, *Law of the Sea, *Treaties, Mineral industry, Continental margin, Continental slope, Anadromous fish, Marine fish, Fish conservation, Fish management, International waters, Mining, Manganese, Navigation, Oceans, Oil, Political constraints, United Nations, United States, Water law.
Identifiers: Coastal zones, *Seabed mining, Territorial waters, Law of the Sea Conference, Coastal waters, International agreement, Mineral rights, Outer continental shelf, 200-mile economic zone.

Man has just begun to utilize the natural resources of the sea. These four monographs examine the physical and political difficulties involved in the use of oceanic resources and the international law that must deal with these problems. The old international law based on custom, combined with the unilateral actions and bilateral agreements of some nations, was often unable to deal with modern problems. In an effort to resolve these conflicts, the United Nations held a series of three Law of the Sea Conferences. The first, held in 1958, resulted in four Geneva Conventions dealing with high seas, territorial sea, continental shelf, and fishing and conservation. None has been widely ratified. The second, in 1960, resolved nothing. The third conference, to be held soon, must deal with the peaceful exploitation of living and nonliving resources, and the preservation of the marine environment. The principle of the 'common heritage of mankind' must compete with the rights of States and individuals to have access to oceanic resources. The author believes that a treaty will emerge from the conference only if each country is willing to make some extremely painful decisions. (Jordan-Florida)
W78-00778

MARINE SCIENTIFIC RESEARCH AND THE LAW OF THE SEA CONFERENCE: SOME PROPOSED AMENDMENTS TO THE REVISED TEXT,
Woods Hole Oceanographic Institution, MA.
R. Winner.
Technical Report WHOI 76-80, September 1976. 54 p.

Descriptors: *Law of the Sea, *International law, *International waters, Research and development, Research priorities, Marine biology, Coasts, Water law, Oceans, Seashores, Continental shelf, Treaties, Negotiations, Oceanography, Technology, Resources development, Marine geology, Legal aspects.
Identifiers: *International agreements, Law of the Sea Conference, Coastal waters, Sovereign immunity, Marine environment, Outer continental shelf, Marine resources, Coastal zones, Territorial seas(Jurisdiction), Seabed mining.

International treaty provisions and negotiations affecting marine scientific research are under consideration by the fifth session of the Law of the Sea Conference. The author addresses those aspects of the negotiations that directly affect marine scientific research. He bases his analysis principally upon a study of the first single negotiating text produced in the third session, contrasting this with the revised single negotiating text produced by the fourth session of the conference. Topics discussed include: (1) the nature of the divergent interests the treaty negotiations are trying to conciliate; (2) the treaty provisions and international law dealing with marine research before the third conference; (3) the direction indicated by the third session negotiations; and (4) recommended amendments to the revised text. Particularly examined are the texts of the three committees on the conference. Committee I deals with the law of the deep seabed beyond the claims of national sovereignty. Committee II has responsibility for defining the geographic limits of, and substantive rights within, the territorial sea, economic zone, and high sea. Committee III is concerned with marine environmental protection and preservation, marine scientific research, and technology transfer. (Howard-Florida)
W78-00779

INTERNATIONAL OCEAN INSTITUTE,
Center for the Study of Democratic Institutions, Santa Barbara, CA.
E. M. Borgese.
Oceans, Vol. 10, No. 1, p. 52-57, January 1977.

Descriptors: *Treaties, *International waters, *International law, *United Nations, *Exploitation, Exploration, Natural resources, Environmental effects, Water pollution, Pollution abatement, Ecological distribution, Technology, Foreign countries, Oceans, Water law, Economic prediction, Law of the Sea, Institutions, Planning.
Identifiers: *Mediterranean Ocean, *Territorial waters, Territorial seas(Jurisdiction).

Increased accessibility to the ocean's vast resources made possible by the technological revolution makes an international race for exploitation with consequent conflict and pollution inevitable. Since the old law of the sea based on the sovereignty of coastal states within a 3-mile territorial limit is adequate, a new concept, the common heritage of mankind, should take its place. The United Nations helped to found the International Ocean Institute at the University of Malta. The purpose of the Institute is to study the establishment of a new international order in the oceans and to propose new approaches and solutions. The Institute held a seminar on pollution of the Mediterranean and examined the existing pollution control legislation in all the Mediterranean states. The Institute's three-step plan for the Mediterranean area includes: (1) strengthening of existing regional bodies and institutions; (2) creating new bodies for regulating unregulated uses of marine areas; and (3) coordination of the policies of the various agencies and governments involved. The Institute's work is not limited to the Mediterranean. Studies of a new international economic order and of the Law of the Sea Convention are also underway. (Steger-Florida)
W78-00780

SOUTHERN DISCOMFORT - LEARNING TO LIVE WITH THE WATER ACT,
For primary bibliographic entry see Field 5G.
W78-00781

WATER QUALITY WORKSHOPS: TALKING IT OVER WITH EPA,
American Forestry Association, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00782

NINETEENTH CENTURY DAMS AND TWENTIETH CENTURY PROBLEMS: COMMENTARY ON A STATUTORY SOLUTION,
Catholic Univ. of America, Washington, DC. Law School.
G. G. Waite.
Maine Law Review, Vol. 28, No. 2, p. 419-34, 1977.

Descriptors: *Impoundments, *Water level fluctuations, *Riparian rights, *Operation and maintenance, *Maine, Dams, Easements, Taxes, Retaining walls, Barriers, Watercourses(Legal aspects), Property values, Legislation, Compensation, Regulated flow, Obstruction to flow, Streamflow.
Identifiers: *Dam effects, Property interests.

It is difficult to adjust the rights of dam owners, other shoreline owners, and the public so that watercourses may be maintained in a condition compatible with the needs of watercourse users without laying an undue financial burden on individual landowners. The state of Maine has enacted a statute to adjust such rights. The statute regulates many old, unused dams and stablizes water levels in their impoundments, but it makes only limited reference to abandonment of commercially worthless dams. Since the primary public concern is the effect of abandonment of dam operations on streams and shoreline owners, the author finds such limited reference unsatisfactory. The statute may also be unconstitutional, either as a tax or as an oppressive form of police power, because of the provisions of the statute that impose heavy maintenance and operation costs on the dam owner and other provisions that regulate transfer of title. The statute could possibly be salvaged through revisions such as expanding the definition of a dam, making transfer more equitable, and dealing with abandonment in detail. (Thomas-Florida)
W78-00783

THE THIRD UNITED NATIONS CONFERENCE ON THE LAW OF THE SEA: THE 1976 NEW YORK SESSIONS,
Bureau of Oceans and International Environmental and Scientific Affairs, Washington, DC.
B. H. Oxman.
The American Journal of International Law, Vol. 71, p. 247-69, April 1977.

Descriptors: *International law, *Law of the Sea, *United Nations, *Treaties, *International waters, Exploitation, Continental shelf, Mining, Regulation, International commissions, Legal aspects, Foreign trade, Commercial fishing, Navigation, Oceans, Water law, Ownership of beds, Beds under water, Governments, Regulation, Political aspects, Political constraints.
Identifiers: Seabed mining, 200-mile economic zone, United Nations Conference on the Law of the Sea, Deep seabeds, International regimes, Mineral resources, Minerals, Outer continental shelf.

The purpose of the United Nations Conference on the Law of the Sea was to formulate an international treaty. There are two major problem areas which must be resolved before any treaty can be finalized. The first problem is the dispute between the industrialized and developing nations over exploitation of deep seabed mineral resources. The author indicates this is largely symbolic since each nation has individual interests. Ultimately, what must be settled is how the seabeds will be partitioned while preserving a universal right to their use. The second problem is the proposed creation of 200-mile economic zones surrounding coastal states. Concern here centers on whether these states will attempt to assert power beyond the areas allowed, i.e., fishing rights, vessel pollution, some scientific research. For most purposes, the economic zone would retain the same status as high seas. The author concludes that a settling of these problems and final passage of the treaty will contribute not only to agreement concerning the sea, but also to increasing worldwide stability and consequently to a decreasing in international tensions. (Malefatto-Florida)
W78-00784

U.S. INDUSTRY AND STATES URGE A RETHINK OF WATER QUALITY LAW.
For primary bibliographic entry see Field 5G.
W78-00785

PRESIDENT ANNOUNCES MEASURES TO CONTROL MARINE OIL POLLUTION,
Executive Office of the President, Washington, DC.

J. Carter.
Department of State Bulletin, Vol. 76, No. 1974, p. 422-23, April 25, 1977.

Descriptors: *Oil spills, *Oil pollution, *Oceans, *International commissions, Disasters, Beaches, Coast Guard regulations, Coasts, Conferences, Ecology, Compensation, Environmental engineering, Foreign countries, International waters, Leakage, Negligence, Oil, United States, Water pollution control, Ships, Transportation.
Identifiers: Tankers, Marine environment, Coastal waters, Environmental policy, Environmental Protection Agency, International agreements, Liability, Vessels, Supertankers.

Oil pollution of the oceans is a serious problem requiring concentrated and prompt action by the Environmental Protection Agency and the United States Coast Guard. The objectives of the federal government are to reduce marine oil pollution, improve the government's ability to deal with spills, and provide dependable compensation to victims. In an effort to coordinate an effective program to control pollution of the oceans the President offers several recommendations. These include ratification of the International Convection for the Prevention of Pollution from Ships, reform of ship construction and equipment standards on new tankers, and improvement of crew standards and training. He also suggests the development of a Tanker Boarding Program and a Marine Safety Information System, approval of Comprehensive Oil Pollution Liability and Compensation Legislation, and improvement of federal ability to respond to oil pollution emergencies. Though the risks involved in marine transportation of oil cannot be entirely eradicated, they may be reduced by an effective control program. (Spector-Florida)
W78-00786

OCEANOGRAPHY AND THE LAW OF THE SEA,
Portugese, State Secretariat for Fisheries, Lisbon.
M. Ruivo.
UNESCO Courier, Vol. 30, p. 10-13, January 1977.

Descriptors: *Law of the Sea, *Foreign countries, *Water resources development, *International waters, Oceans, Research and development, Legal aspects, Water control, Water resources, Federal government, Natural resources, Political aspects, Planning, Resources, Water policy, Conferences, International law, Foreign waters, Continental shelf.
Identifiers: Marine resources, International agreements, Seabed mining, Marine environment, Minerals, Outer continental shelf, Territorial waters, Water rights(Non-riparians).

As marine science is increasingly applied for peaceful as well as military and security purposes, contradictions arise between maritime practice and traditional maritime law. To resolve such conflicts two conferences on the Law of the Sea developed provisions for regulation of scientific research. The guidelines maintained the prinicple of freedom of the seas except for the Continental Shelf area and provided that Coastal States should not normally withhold consent to a legitimate research request as long as that State could participate. However, newly independent nations question the equity of the proposals. Recently, through agencies such as Unesco's Intergovernmental Oceanographic Commission, cooperation in oceanographic research, although still dominated by industrialized countries, has increased by all continents. Developing countries remain uneasy about research regulations because they are convinced of their need to control and benefit from the information derived from research activities to protect their interests, including national defense. Success of the new rules for oceanographic research depends upon negotiation and compromise in a spirit of international cooperation. (Mulligan-Florida)
W78-00787

THOU SHALT NOT FILL PUBLIC WATERS WITHOUT PUBLIC PERMISSION - WASHINGTON'S LAKE CHELAN DECISION,
Washington Univ., Seattle. School of Law.
C. E. Corker.
Washington Law Review, Vol. 45, No. 1, p. 65-93, March 1970.

Descriptors: *Washington, *Riparian rights, *Lake shores, *Boundary disputes, Banks, Judicial decisions, Navigation, Legal aspects, Navigable waters, Riparian waters, Shores, Lakes, Water utilization, Shallow water, Boundaries(Property), Littoral, Water law, Prescriptive rights, Water level fluctuations, Riparian land.
Identifiers: *Submerged lands, Navigability, Property, Property interests, Real property law, State policy, Navigation obstructions.

A Washington Supreme Court decision ordered defendants whose lands were seasonally inundated by the waters of Lake Chelan to remove fill because it obstructed the rights of plaintiffs and public to swim, boat, fish, play and navigate in the waters of the lake. The author supports the holding that ownership of lands beneath navigable waters does not give the owner a right to restrict use of those waters for all the public purposes to which they are suited even though the lands were above the natural high water level of the lake before construction of a hydroelectric project. The dissent relied upon that fact in deciding that defendants' lots were not subject to public navigation rights. Unresolved questions discussed include: (1) whether all fills in navigable waters must be abated; (2) which waters are navigable'; (3) whether prescription is a better doctrine than navigation to achieve similar results; and (4) whether there is a protected right to view the water. The author concludes that this decision may curtail sale of tide- and shore-lands. He recommneds legislation asserting public ownership of such lands, as well as planning for conservation and utilization of these assets. (Mulligan-Florida)
W78-00788

THE ROLE OF INSURANCE IN ENVIRONMENTAL LITIGATION,
McKenna, Storer, Rowe, White and Farrug, Chicago, IL.
For primary bibliographic entry see Field 6F.
W78-00789

OIL POLLUTION OF COASTAL AND INLAND WATERS UNDER THE WATER QUALITY IMPROVEMENT ACT OF 1970,
Mendes and Mount, New York.
For primary bibliographic entry see Field 5G.
W78-00790

CLEAN WATER PROGRESS - YES, SPEED - NO,
Committee on Public Works and Transportation (U.S. House).
For primary bibliographic entry see Field 5G.
W78-00791

REPUBLIC STEEL CORPORATION V. TRAIN (ENVIRONMENTAL PROTECTION AGENCY PERMIT OBJECTION IMPROPER WHERE NO GUIDELINES AVAILABLE).
557 F.2d 91-8 (6th Cir. 1977).

Descriptors: *Federal Water Pollution Control Act, *Water quality standards, *State jurisdiction, *Permits, Legislation, Industries, Water pollution control, Pollution abatement, Administrative agencies, Effluents, Water pollution sources, Legal aspects, State governments, Discharges(Water), Industrial wastes, *Ohio, Regulation, Water law, Navigable waterways, Industrial wastes, Industrial plants.
Identifiers: National Pollution Discharge Elimination System, Federal Water Pollution Control Act Amendments of 1972, Effluent limitations, Effluent guidelines, Administrative regulations, Best practicable control technology.

Petitioner steel company sought a National Discharge Elimination System permit which was granted by the State of Ohio but blocked by the federal Environmental Protection Agency (EPA). The EPA blocked the permit because it extended the date for the petitioner's compliance with effluent control standards beyond that prescribed in the Water Pollution Control Act Amendments. The petitioner maintained that since the EPA had failed to establish standards for the steel industry, as it was supposed to, the extension should have been granted. The United States Sixth Circuit Court of Appeals stated, in answer to the EPA's contrary arguments, that the Act and its legislative history made clear that Congress did not intend to subject polluters to sanctions before the EPA had established guidelines. The court also rejected the EPA's contention that it had implicitly ratified the Ohio effluent limitations. This could only be done under a statute mandating it, and none exists. The court allowed the EPA thirty days to review other sections of the Ohio permit for full compliance with the provisions of the Water Pollution Control Act. If it complied, the permit was to be granted. (Malefatto-Florida)
W78-00792

CONNECTICUT LIGHT AND POWER COMPANY V. FEDERAL POWER COMMISSION (NAVIGABILITY - DEFINED FOR LICENSING OF HYDROELECTRIC PROJECTS).
557 F.2d 349-58 (2d Cir. 1977).

Descriptors: *Federal Power Act, *Hydroelectric project licensing, *Navigable rivers, *Utilities, *Administrative decisions, Legislation, Hydroelectric, Jurisdiction, Plants, Transportation, Public works, Water utilization, *Connecticut, Administrative agencies, Regulation, Water law, Navigable waters, Rivers, Electric power, Legal aspects.
Identifiers: *Administrative regulations, Licenses, Housatonic River, Navigability tests.

Petitioner electric utility challenged a decision by the Federal Power Commission in the United States Second Circuit Court of Appeals. The decision required the licensing of petitioner's four hydroelectric projects on the Housatonic River in Connecticut, under the authority of the Federal Power Act. The Act requires the Commission to license all such projects built on navigable rivers. The petitioner maintained that the Housatonic is not navigable. The court first found that a 1952 decision by the Commission not to license a project on the river was not applicable since administrative decisions are confined to particular cases. To support its present licensing decision, the Commission offered much historical data showing the Housatonic had been used for transportation purposes, including the transport of logs. The court accepted the logging data as evidence of navigability holding that term to refer to uses by anything from logs to ocean liners. Though conceding the Housatonic's importance as a navigable waterway had declined, the court maintained that once a waterway was found to be navigable, it remained so. Thus, the Commission's licensing decision was upheld. (Malefatto-Florida)
W78-00793

INTERSTATE WATERS - BOULDER CANYON PROJECT.
Nev. Rev. Stat. secs. 538.010 thru 538.030 (1975).

Descriptors: *Nevada, *Colorado River Compact, *Legislation, *Boulder Canyon Project Act, Water control, Water resources development, Water law, Dams, Legal aspects, Governmental interrelations, State governments, Water policy, Water rights, Governments, State governments, Payment, Projects, Compensation.

The Nevada legislature has approved revised provisions of the Colorado River Compact which will become binding whenever six signatory states have ratified it and Congress approves. Guidelines are set forth under which Nevada will receive payments in commutation and in lieu of payments now provided by section 4(b) of the Boulder Canyon Project Act. The guidelines depend upon enactment of Congressional legislation providing for such payments. The amount of the annual payment, the date due and the minimum number of years for payment are established. The Nevada attorney general is authorized to determine whether there is substantial conformity between the provisions of the Congressional legislation and the provisions of this section and to communicate that to the Secretary of the Interior through the Governor. Any payments received under this Boulder Canyon Project Adjustment Act shall be placed by the state treasurer in the state's general fund. This legislation becomes effective immediately upon the effective data of such Congressional legislation. If none is passed, the enactment of this section in no way diminishes rights under the Boulder Canyon Project Act. (Mulligan-Florida)
W78-00794

STATE V. MIZRAHI (AUTHORITY OF MUNICIPALITY TO CHARGE PUBLIC FOR USE OF BEACH).
373 A.2d 433-34 (N.J. Super. Ct. 1977).

Descriptors: *New Jersey, *Public rights, *Beaches, *Permits, *Recreation facilities, Legal aspects, Recreation, Atlantic Ocean, Littoral, Permits, Public access, Regulation, Local governments, Legislation, Coasts, Shores, Boundary disputes, Intertidal areas, Law enforcement.
Identifiers: Municipal ordinance, Licenses, Public Trust Doctrine, Due process, Equal protection, Foreshore, User charges.

The defendant was convicted of using the beach without a beach badge required by a city ordinance. The defendant was lying on the foreshore, or seaward side of the mean high tide line, without the required badge and he refused to leave when asked to do so by the beach patrol. The defendant contended that the city had no power to charge a fee for the use of the beach since it is owned by the state. He also argued that the ordinance was unconstitutionally vague in defining the littoral boundaries of the paid beaches. His final contention was that the ordinance violated the Equal Protection Clause because it infringed on the public's legal right to use the beach without the burden of municipal fees. The Superior Court of New Jersey, Appellate Division, took notice that the ordinance applied equally to both residents and nonresidents. The court found defendant's contentions to be without merit. The right merely to pass along the foreshore was distinguished from the right to use beach facilities with the benefit of municipal services, such as the cleaning and maintaining of the beach and lifeguard services. (Quarles-Florida)
W78-00795

CONTROL OF WATER POLLUTION IN NEW YORK CITY,
New York City Dept. of Water Resources.
M. Lang, C. Samowitz, and M. Jethwani.
Water Research, Vol. 9, No. 11, p. 981-91, November 1975. 10 fig.

Descriptors: *Long-term planning, *New York, *Water pollution control, *Sludge treatment, Pollutants, Water pollution, Water treatment, Waste treatment, Impaired water quality, Pollution(Water), Activated sludge, Wastes, Sludge disposal, Water pollution treatment, Water resources, Development, Aeration, Water purification.
Identifiers: Environmental policy.

Implementation of a water pollution control program in a major metropolis requires three stages: (1) a period of education to convince the public and elected representatives of the need for a program; (2) continuing fiscal commitment and budgetary negotiations; (3) actual design and construction. Adherence to a master plan for long-term pollution control is complicated by uncertainty of the projected effluent requirements, population concentration and technological improvements at the completion time. The New York City water pollution control program is an example of a successful experience with long-range planning. The adjustment of oxygen deficiencies in inner waterways are the research and development of improved aeration facilities for the activated sludge process are discussed in depth. The focus of the New York program was to preserve and enhance the receiving waters. Its success depended upon incorporation of new processes, a continuing ability to negotiate with regulatory agencies, groups controlling funding, and the growing number of persons concerned with potential damage to the environment. (Mulligan-Florida)
W78-00796

UNITED STATES V. HAMEL (GASOLINE AS A POLLUTANT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
551 F.2d 107-13 (6th Cir. 1977).

Descriptors: *Pollutants, *Federal Water Pollution Control Act, *Oil pollution, *Gasoline, Michigan, Oil wastes, Judicial decisions, Penalties(Legal), Pollutant identification, Wastes, Rivers and Harbors Act, Legal aspects, Water pollution, Navigable waters, Oil, Oil spills, Organic compounds, United States, Lakes, Legislation, Water pollution sources.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, Liability.

The defendant's conviction of willfully discharging gasoline into a navigable waterway in violation of the Federal Water Pollution Control Act (FWPCA) was affirmed. Defendant contented that gasoline is not a pollutant within the definitional criteria set forth in the FWPCA. He also insisted that the Federal Water Pollution Control Act Amendments of 1972 were not intended to provide criminal penalties for gasoline spills because criminal sanctions were already available under the Refuse Act. The plaintiff federal government had successfully contended at trial that gasoline could be subsumed under 'biological materials' category for pollutants. In affirming the conviction, the Sixth Circuit Court of Appeals scrutinized the ligislative intent and history of the FWPCA. The court observed that Congress intended the FWPCA to encompass at the minimum what was covered under the Refuse Act of 1899. Using this legislative background coupled with the fact that water pollution legislation is given a generous construction in the Sixth Circuit, the court found gasoline to be a pollutant under the FWPCA. (Quarles-Florida)
W78-00797

DEEDS: DESCRIPTION OF LAND CONVEYED BY REFERENCE TO RIVER OR STREAM AS CARRYING TO THREAD OR CENTER OR ONLY TO BANK THEREOF - MODERN STATUS,
G. A. Locke.
78 ALR3d 604-18 (1977).

Descriptors: *Watercourses(Legal aspects), *Boundary disputes, *Boundaries(Property), *Land tenure, Water law, Rivers, Streams, Judicial decisions, Legal aspects, Legal review, Ownership of beds, Low water mark, Banks, River beds, Non-navigable waters, Navigable waters.
Identifiers: Property interests, Real property law, Presumptions(Legal).

In general, when land is conveyed by reference to a river or stream, the boundary carries only to the thread or center thereof. This principle, used when the deed does not specifically contradict it, is considered a presumption in some jurisdictions and a rule of construction in others. The author discusses the application or limitation of the principle in several court decisions. Where the reference in a deed was solely to the river or stream itself as a boundary, the conveyance included the bed of the river as far as the thread. Where the deed referred to the bank of a river as a boundary, there has been a split of authority as to whether title was conveyed to the center of the waterway. A deed which refers to the low-water mark of a river as the boundary was held not to convey the bed of the river unless a contrary intention was shown on the part of the grantor. If a deed refers to both the river and the bank, conveyance is allowed to the center; if it refers to the river itself and the other side of the river, the entire bed is conveyed. (Jones-Florida)
W78-00798

JURISDICTIONAL EXPANSION OF THE ARMY CORPS OF ENGINEERS UNDER FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
For primary bibliographic entry see Field 5G.
W78-00799

THE PROPOSED OUTER CONTINENTAL SHELF LANDS ACT AMENDMENTS OF 1976: AN INADEQUATE GUIDE TO OUTER CONTINENTAL SHELF DEVELOPMENT,
Harvard Law School, Cambridge, MA.
J. S. Cole.
Harvard Journal on Legislation, Vol 14, No 2, p. 358-94, April 1977.

Descriptors: *Continental shelf, *Energy, *Oil pollution, *Exploration, *Legislation, Fuels, Federal government, Oil industry, Oil spills, Oceans, Oil wells, Ecology, Exploitation, Bids, Offshore platforms, Pollutants, Water pollution control, Compensation, Leases.
Identifiers: Coastal waters, Oil spill cleanup, *Outer Continental Shelf, Liability, Marine environment, Energy crisis, Environmental policy, Hazardous substances(Pollution).

Major revisions of the Outer Continental Shelf Lands Act of 1953 (OCSLA) are under consideration by Congress. The author's analysis of the revisions includes: (1) the method proposed for determining where oil and gas development will occur on the continental shelf; (2) the provision for alternative bidding methods to allocate development rights among oil and gas companies; and (3) the provisions concerning compensation and imposition of liability when damage from oil spills occurs. While the amendments reflect a strong congressional desire to promote oil and gas developments, the proposals lack any guuidance regarding the weight to be given to interests in uses of the outer continental shelf other than for oil and gas exploitation so that these other uses may be virtually excluded. Although the author criticizes the new leasing procedure bidding techniques under the proposed amendments as ineffective to answer the charges of production inefficiency and lack of competitiveness leveled against the present OCSLA bidding system, he fells that the remedy for the OCSLA's failure to impose liability for oil spills will be adequate to compensate damaged parties and deter behavior which causes spills. (Howard-Florida)
W78-00800

PROBLEMS OF COASTAL MANAGEMENT,
Florida Dept. of Natural Resources, Tallahassee. Bureau of Beaches and Shores.
W. M. Sensabaugh.
Shore and Beach, Vol 44, No 1, p. 6, April 1976.

Descriptors: *Florida, *Shore protection, *Beaches, *Beach erosion, Land management, Dunes, Legal aspects, State jurisdiction, Coastal engineering, Hurricanes, Land use, Protection, Erosion, State governments, Administrative agencies, Permits, High water mark, Atlantic Ocean, Gulf of Mexico, Coastal structures, Boundaries(Property).
Identifiers: Coastal zone management, State policy, Coastal zones, Environmental policy, Property interests, Real property law, Setback lines, Beach nourishment.

Although the Florida Bureau of Beaches and Shores of the Department of Natural Resources was not the primary administrator of Coastal Zone management, its efforts provided valuable coastline protection. Three major programs of the Bureau served to preserve the sandy beaches along the state's coasts. The first, a regulatory project, involved permit issuance for beach erosion control structures such as groins, jetties and breakwaters built seaward of the mean high water line. The second program entailed channeling state funds to the localities on a matching basis for beach nourishment and erosion control projects. The most significant function of the Bureau has been regulation of beach front construction through setback lines established on a county by county basis for both the Atlantic and Gulf Coast beaches. Before the setback line is established, a comprehensive coastal engineering study must be done to show the line is needed to prevent beach erosion and protect upland development. Although the setback line law provides for variances to allow construction seaward of the line, this provision has not yet proved to have weakened the law. (Cocheu-Florida)
W78-00801

6F. Nonstructural Alternatives

COSTS OF ERRORS IN DEFINING A COMMUNITY'S FLOOD PLAIN,
University of Southern Mississippi, Hattiesburg. Bureau of Business Research.
D. L. Daniel, and D. C. Williams, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 762, Price codes: A03 in paper copy, A01 in microfiche. Mississippi State University, Mississippi State, Water Resources Research Institute, Completion Report, September 1977. 44 p, 4 fig, 4 tab. OWRT A-104-MISS(1), 14-34-0001-7052.

Descriptors: Flood plains, Insurance, Zoning, Regulation, *Costs, *Flood plain insurance, *Flood plain zoning, *Flood protection, Risks, Estimating, Social aspects.
Identifiers: *Flood risk.

Under the National Flood Insurance Act of 1968, as expanded by the Flood Disaster Protection Act of 1973, flood insurance is made available to flood-prone areas. In addition, new construction and substantial improvements of existing structures must, for most practical purposes, be constructed so as to be flood proof with respect to a 100-year flood. Obviously, construction requirements as well as actuarial rates for the flood insurance on structures in a flood-prone area. However, risk estimates can never be completely free of error. The relationship between erroneous estimates of flood risk and the economic consequences of those errors was analyzed. The variables upon which the costs of errors depend are presented. An analysis is included as to who bears the costs arising out of these errors and the social as well as private consequences of the errors.
W78-00558

THE NATIONAL FLOOD INSURANCE PROGRAM: SOME MIDSTREAM PERSPECTIVES,
Massachusetts Univ., Amherst. Dept. of Geography; and Massachusetts Univ., Amherst. Dept. of Law.
R. H. Platt.
Journal of the American Institute of Planners, Vol 43, No 3, July 1976. p 303-313, 4 fig, 1 tab, 25 ref.

Descriptors: *Flood Plain Insurance, *Management, *Planning, *Legal aspects, *Regulation, *Mapping, *Rates, Non-structural alternatives, Flood data, Building codes, Flood plain zoning.
Identifiers: *National Flood Insurance Program, *Flood plain management, *Premium rates, Flood insurance rates.

The history of flood plain regulation and an overview of the National Flood Insurance Program (NFIP) are presented as background to a discussion of implementation of the NFIP. Four issues of flood plain management and the NFIP stand in the way of final implementation--the constitutional issue, the mapping issue, the rate issue, and the regulatory issue. The constitutional issue hinges on the fear that flood plain regulations may constitute a 'taking without just compensation'. The validity of this fear is discounted via an analysis of relevant judicial decisions. This analysis also provides insight into how to design legally valid regulations. The mapping issue stems from the need for and lack of accurate floodplain maps at scales suitable for land use controls. Methods for designating interim flood plain boundaries are suggested. The rate issue involves the question of which of two authorized flood insurance rates to charge. The choice of rates will influence the amount of construction in the floodplain. The regulatory issue is whether federal policy encourages reduction of flood losses through control of the location of new development or its design, or both. The accepted resolution of this problem is presented and analyzed. (Nessa-NC)
W78-00747

FLOOD PLAIN INFORMATION: COTTONWOOD CREEK, EL PASO COUNTY, COLORADO.
Army Engineer District, Albuquerque, NM.
For primary bibliographic entry see Field 4A.
W78-00757

SPECIAL FLOOD HAZARD INFORMATION REPORT: CONGAREE RIVER, BROAD RIVER, AND SALUDA RIVER, RICHLAND AND LEXINGTON COUNTIES, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
For primary bibliographic entry see Field 4A.
W78-00758

FLOOD PLAIN INFORMATION: STONEY BRANCH AND TRIBUTARIES, ROCK HILL, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
For primary bibliographic entry see Field 4A.
W78-00760

FLOOD PLAIN INFORMATION: EAST RIVER AND TRIBUTARIES, CITY OF GREEN BAY AND BROWN COUNTY, WISCONSIN.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-00761

FLOOD PLAIN INFORMATION: MENOMINEE RIVER--GREEN BAY, MARINETTE COUNTY, WI, MENOMINEE COUNTY, MI, CITIES OF MARINETTE, WI--MENOMINEE, MI.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-00762

FLOOD PLAIN INFORMATION: BEAVER CREEK AND TRIBUTARIES, VICINITY OF HUNTINGTON, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00763

NORTH FORK OBION RIVER, HOOSIER CREEK, AND GROVE CREEK, UNION CITY, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00764

FLOOD PLAIN INFORMATION: SUGAR CREEK, LITTLE NIXON CREEK, AND TRIBUTARIES, VICINITY OF BROWNSVILLE, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00765

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, ASHLAND CITY, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00766

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, CANEY FORK RIVER, CARTHAGE, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00767

FLOOD PLAIN INFORMATION: SULPHUR FORK, SPRINGFIELD, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00768

FLOOD PLAIN INFORMATION: BLACK EARTH CREEK, DANE COUNTY, WI-VILLAGES OF MAZOMANIE, BLACK EARTH, AND CROSS PLAINS.
Army Engineer District, St. Paul, MN.
For primary bibliographic entry see Field 4A.
W78-00769

FLOOD PLAIN INFORMATION: NORTH NASHUA RIVER, FITCHBURG, AND LEOMINSTER, MASSACHUSETTS.
Army Engineer District, Waltham, MA.
For primary bibliographic entry see Field 4A.
W78-00770

CONNECTICUT RIVER BASIN SUPPLEMENTAL STUDY, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS AND CONNECTICUT. THE RIVER'S REACH. PHASE I. SOME ENVIRONMENTAL AND FLOOD PLAIN MANAGEMENT IMPLICATIONS OF THE CHANGING ROLE OF AGRICULTURE,
Economic Research Service, Broomall, PA.
For primary bibliographic entry see Field 4A.
W78-00774

THE ROLE OF INSURANCE IN ENVIRONMENTAL LITIGATION,
McKenna, Storer, Rowe, White and Farrug, Chicago, IL.
R. S. Soderstrom.
Forum, Vol. 11, No. 3, p. 762-77, Spring 1976.

Descriptors: *Insurance, *Negligence, *Water pollution, *Damages, Air pollution, Soil contamination, Compensation, Legal aspects, Protection, Risks, Environmental effects, Environment, Judicial decisions, Oil pollution, Pollution abatement.
Identifiers: *Liability.

The rise in environmental litigation has generated changes in insurance coverage. In 1966 general lia-

bility policies covered injuries caused by 'occurrences'. An occurrence was defined as an accident, including continuous or repeated exposure to conditions, which results in injury neither expected nor intended. Because courts construed this phrase to include coverage for injury resulting from pollution caused by violation of environmental responsibilities, insurance companies began to limit coverage to sudden and accidental pollution and to exclude coverage for willful, intentional or expected violations of environmental regulations. Later, damage from oil spillage was excluded entirely. The author suggests that specific pollution coverage is not only desirable but also necessary. The creation of a facility for the underwriting of legal liability arising from environmental impairment whether sudden, unintended or unexpected has been recommended. This would help solve one of the most vexing problems, that of coverage for residual pollution. The author discusses the specific provisions and benefits of environmental impairment liability coverage. The conclusion is that the transition of this type of insurance is almost inevitable because of coverage and defense problems of pollution exclusion. (Maass-Florida)
W78-00789

6G. Ecologic Impact Of Water Development

EVALUATION OF STREAMSIDE BUFFERSTRIPS FOR PROTECTING AQUATIC ORGANISMS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W78-00553

FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE ORGANISMS AND ECOSYSTEMS.
For primary bibliographic entry see Field 5C.
W78-00572

CRITICAL SPECIES, INCLUDING MAN, WITHIN THE BIOSPHERE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5G.
W78-00619

WATER FOR ENERGY: AN APPROACH TO COMPREHENSIVE IMPACT ASSESSMENT,
New Mexico State Univ., University Park. Dept. of Agricultural Economics and Agricultural Business.
J. A. Diemer, and N. Wengert.
Water Resources Bulletin, Vol. 13, No. 5, p 885-893, October 1977. 22 ref.

Descriptors: *Water allocation(Policy), *Decision making, *Mathematical models, *Energy, *Alternative planning, *Comprehensive planning, *Colorado River, *Great Basin, Regional analysis, Economics, Water resources, Analytical techniques, Optimization, Simulation analysis, Assessment, Systems analysis.
Identifiers: Water use patterns, Sub-models, Policy making, Impact analysis, Water/energy systems analysis, Decision models.

The effects of energy development on the water resources of the Colorado River and Great Basin regions are expected to be substantial. Complex physical, economic and institutional interactions may be expected. Most research on these impacts appears single purpose, fragmented, uncoordinated, and often inaccessible to potential users, particularly to those with responsibility for energy/water policy and program decisions. A comprehensive, integrative framework for assessing alternative water allocation decisions is outlined, with a heuristic decision making model for evaluating impacts on maximization of gross (or net) regional product and regional social welfare, and for assessing the region's contribution to national economic objectives. The suggested model provides a structure for application and integration of data of various kinds to a range of situations arising from possible impacts from energy proposals. The focus is on water/energy relationships but the model may provide a framework for comprehensive analysis of a variety of environmental actions and resulting system perturbations and effects. (Bell-Cornell)
W78-00624

EFFECTS OF NEPA'S REVIEW AND COMMENT PROCESS ON WATER RESOURCE PLANNING (SURVEY RESULTS),
Stanford Univ., Calif. Dept. of Engineering.
W. W. Hill, and L. Ortolano.
Water Resources Research, Vol 12, No 5, p 1093-1100, December 1976. 1 fig, 1 tab, 16 ref.

Descriptors: *Planning, *Coordination, *Water resources development, *Decision making, Management, Comprehensive planning, Environment, Environmental effects, Watershed management, Administration, Resource allocation, Water management(Applied), Administrative agencies, Administrative decisions, Alternative planning, Project planning, Evaluation, Economics, Social aspects.
Identifiers: *Environmental impact statement, National Environmental Policy Act, Administrative regulations.

The guidelines of the Council on Environmental Quality for implementing the National Environmental Policy Act require that environmental impact statements be circulated to other agencies and to the public for review and comment. The effects of the review and comment process spawned by this requirement are assessed in the context of water resources planning by the U.S. Army Corps of Engineers and the Soil Conservation Service (SCS). The evaluation relies on data from in-depth questionnaire surveys mailed to personnel in all Corps districts and SCS state offices during 1974. The study addresses the extent to which increased coordination and exchange of information between agencies were affected by the comment process. Additionally, the consideration given to environmental information in agency decision-making is discussed. Lack of man-hour resources, late return of critiques and political and institutional constraints are noted as obstacles to the effective functioning of the review and comment process. It is suggested that an informal review and comment process should be instituted allowing for review before planning has narrowed to consideration of a single alternative. (Mulligan-Florida)
W78-00654

SIERRA CLUB V. MORTON (REQUIREMENTS OF FINAL ENVIRONMENTAL IMPACT STATEMENTS FOR DAM PROJECTS).
For primary bibliographic entry see Field 6E.
W78-00671

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION V. INTAKE WATER COMPANY (INCHOATE RIGHT TO APPROPRIATE WATER DESPITE DELAY OF ACTUAL CONSTRUCTION).
For primary bibliographic entry see Field 6E.
W78-00674

INLAND LAKE PROTECTION IN NORTHERN MICHIGAN (NORTHERN MICHIGAN ENVIRONMENTAL RESEARCH PROGRAM EDUCATIONAL SERIES: PUBLICATION NO. 1),
Michigan Univ., Ann Arbor, Biological Station.
E. W. Say, M. W. Paddock, J. E. Gannon, and W. L. Foster.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 705, Price codes: A03 in paper copy, A01 in microfiche. Report NSF-RA-E-75-046, September 1975. 43 p.

Descriptors: *Lakes, *Ecology, *Ecosystems, *Michigan, Water quality, Watersheds(Basins), Rivers, Stratification, Eutrophication, Nutrients, Photosynthesis, Environment, Lake stages, Succession, Limnology.
Identifiers: Northern Michigan, *Inland Water Route Region(Mich).

The book was an in-depth ecological look at the area of northern Michigan known as the Inland Water Route region. the lakes, rivers, and wetlands of this area, as well as those which are closely related to it, encompass 1,461 sq mi (3,783 sq km), 7 counties, and include 46 major lakes and 18 rivers and streams. The attributes of this area-its scenic beauty, abundance of wilderness and wildlife areas, inland lakes, rolling hills, and agricultural countryside- are important to the economy, providing tourism appeal for seasonal visitors from across the midwest as well as a livelihood for year-round residents. To further understand northern Michigan's uniqueness, one need only compare it to other parts of the country where inland lakes occur. Unfortunately, many lake and river properties in regions surrounding Michigan's north have become over-developed. Crowded urban and suburban conditions near open inland lakes have often turned over unpolluted waters into 'sinks' for a collection of silt, residential sewage, and industrial waste. This handbook explored the workings of inland lake ecosystems and the aquatic, terrestrial, and social interrelationships involved. Through a basic understanding of problems lakeland environments may face, concerned citizens can do much to protect and preserve the existing excellent quality of their environment. (Sims-ISWS)
W78-00716

INTERIM GUIDE FOR ENVIRONMENTAL ASSESSMENT: HUD FIELD OFFICE EDITION.
Voorhees (Alan M.) and Associates, Inc., McLean, VA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 231, Price codes: A20 in paper copy, A01 in microfiche. Prepared for U.S. Department of Housing and Urban Development, Washington, D.C., Interim Guide, June 1975. 446 p, 94 fig. H-2080 R.

Descriptors: *Environmental effects, *Community development, Social impact, Administrative decisions, Urban planning.
Identifiers: *National Environmental Policy Act, *Environmental assessment, *Community Development Block Grant Program, Urban development.

The five major functions for which this guide was developed include: providing an overview of the philosophy and basic approach to comprehensive environmental assessment suggested for all HUD projects; providing an efficient, comprehensive technical environmental assessment process; providing substantive technical guidance regarding what to look at, what to look for, and how to do it; providing general guidance in conducting a comprehensive environmental assessment under HUD Handbook 1390.1; and providing general guidance in assessing significant environmental impacts of a project. The guide covers the broad range of concerns encountered in the environmental assessment of urban development projects required for compliance with the National Environmental Policy Act under the Community Development Block Grant Program. The guide is designed to follow a standard technical assessment process which may be utilized to support any administrative processing sequence. It supplements the administrative procedures provided in HUD Handbook

1390.1. The guide is a reference document, performing a function analogous to a dictionary or encyclopedia. It is not intended to replace more technical information required when problems arise, or to usurp the freedom of judgment of the person responsible for decision-making. It does not replace HUD Handbook 1390.1 or other HUD policy material. (Nessa-NC)
W78-00749

AN ASSESSMENT METHODOLOGY FOR THE ENVIRONMENTAL IMPACT OF WATER RESOURCE PROJECTS,
Battelle Columbus Labs., OH.
M. L. Warner, J. L. Moore, S. Chatterjee, D. C. Cooper, and C. Ifeadi.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 002, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-600/5-74-016. July 1974. 221 p, 7 fig, 14 tab. 68-01-1871.

Descriptors: *Environmental effects, *Reservoir construction, *Water quality, *Water resources, Planning, Reservoir operation, Social impacts, Economic impacts, Aesthetics, Methodology, Reservoir sites, Mathematical models.
Identifiers: *Environmental Impact Statements, *Ecological impacts.

This report presents technical materials intended for use in reviewing environmental impact statements (EIS) on major reservoir construction projects. Methods and materials for determining the completeness and accuracy of an EIS are discussed, with special emphasis on water quality and ecological impacts. The report contains six related but individually referenced discussions that address: (1) reservoir project planning, construction, and operation activities; (2) water quality impacts of reservoir construction; (3) ecological impacts of reservoir construction; (4) economic, social, and aesthetic impacts of reservoir construction; (5) review criteria for assessing general statement completeness and accuracy; and (6) a review of impact assessment methodologies. Important issues or potential impacts that might be found in an adequate EIS are presented. In addition, the water quality and ecological impacts sections discuss the site-specific conditions under which a given potential impact may or may not occur. The section on water quality impacts also presents a detailed comparison of mathematical models for predicting impacts on water temperature, dissolved oxygen levels, and some chemical constituents of surface waters. The sections dealing with water quality, ecological, and economic-social-aesthetic impacts include extensive citations to relevant literature. This study is applicable to the full range of environmental conditions in which reservoirs may be constructed. (Nessa-NC)
W78-00750

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME I-SUMMARY REPORT,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
I. L. White, F. S. LaGrone, M. A. Chartock, C. P. Bartosh, and R. L. Leonard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 752, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-600/7-77-072a, June 1977. 153 p. 3 fig, 31 tab. 68-01-1916.

Descriptors: *Energy, *Technology, *Electric power, *Environmental effects, *Economic impact, *Social impact, Power plants, Powerline carriers, Coal, Coal mines, Uranium, Oil, Oil shales, Geothermal studies, Natural gas, Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, Wyoming, Methodology.
Identifiers: *Technology assessment, Secondary impacts, Impact analysis, Western energy resource development.

This four volume study constitutes a progress report of a three year technology assessment (TA) of the development of coal, geothermal, natural gas, oil, oil shale and uranium resources. The study area includes Arizona, Colorado, Montana, North Dakota, New Mexico, South Dakota, Utah and Wyoming. The time frame extends from the present to the year 2000. The program's purpose is to identify economically, environmentally, and socially acceptable energy development alternatives. The TA identifies and analyzes a broad range of consequences of energy resource development in the western U.S. It evaluates and compares alternative courses of action for enhancing desirable consequences and mitigating or eliminating undesirable ones. The general description of the TA results found in this volume include: a description of the context and methodological framework; a summary description of the impact analysis; a summary of some policy implications of these results, although the TA is in the early stages of policy analysis; and a description of what the second phase of the project will entail. Volume II contains site-specific analyses; Volume III details alternative policies and implementation strategies; Volume IV discusses air quality modeling alternatives and cost comparisons of energy transporation costs. (See also W78-00754, W78-00755, and W78-00756) (Nessa-NC)
W78-00753

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME II-DETAILED ANALYSES AND SUPPORTING MATERIALS,
Oklahoma Univ., Norman. Science and Public Policy Program.
I. L. White, F. S. La Grove, M. A. Chartock, C. P. Bartosh, and R. L. Leonard.
Available from the National Technical Information Service, Springfield, VA as PB-271 753, Price codes: A99 in paper copy, A01 in microfiche. Report EPA-600/7-77-0726, July 1977. 960 p, 74 fig, 325 tab. 68-01-1916.

Descriptors: *Energy, *Technology, *Research and development, *Environmental effects, Social impact, Aesthetics, Coal, Coal mines, Uranium, Oil, Oil shales, Geothermal studies, Natural gas, Arizona, North Dakota, Colorado, Montana, New Mexico, South Dakota, Utah, Wyoming, Transportation, Transportation impacts, Ecology, Air pollution effects, Water pollution effects.
Identifiers: *Technology assessment, Kaiparowits(UT), Escalante(UT), Navajo(NM), Farmington(NM), Rifle(CO), Gillette(WY), Colstrip(MT), Beulah(ND), Noise, Health effects, Western energy resource development.

This study is one part of a four volume progress report of a technology assessment of Western Energy resources development. The study area includes Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah and Wyoming. The energy resources evaluated include coal, oil, oil shale, geothermal, natural gas, and uranium. The time frame extends from the present to the year 2000. The likely impacts of deploying typical energy resource development technologies at sites representative of the kinds of conditions likely to be encountered in the eight state study area are analyzed. The impacts likely to occur if western energy resources are developed at three different levels of intensity are also analyzed. Site specific analyses are presented for the following areas: Kaiparowits/Escalante, UT; Navajo/Farmington, NM; Rifle, CO; Gillette, WY; Colstrip, MT; and Beulah, ND. Site specific air, water, socio-economic, and ecological impacts are discussed. A regional analysis was also conducted in which transportation, health, noise and aesthetic impacts are evaluated. Volume I provides a general description of the assessment results; Volume III represents a first step in the identification, evaluation and comparison of alternative policies and implementation strategies; Volume IV contains two technical appendices, one covering alternative approaches to modeling air quality in areas with complex terrain, and one on energy transportation cost comparisons. (See also W78-00753, W78-00755, and W78-00756) (Nessa-NC)
W78-00754

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME III-PRELIMINARY POLICY ANALYSIS,
Oklahoma Univ., Norman. Science and Public Policy Program.
I. L. White, F. S. La Grove, M. A. Chartock, C. P. Bartosh, and R. L. Leonard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 754, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-600/7-77-072c, July 1977. 176 p, 1 fig, 7 tab. 68-01-1916.

Descriptors: *Energy, *Technology, *Water quality, *Water supply, Air quality, Community development, Indian reservations, Reclamation, Coal, Oil, Oil shales, Geothermal studies, Natural gas, Uranium, Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, Wyoming, Evaluation, Assessments.
Identifiers: *Energy policy, *Policy alternatives, Technology assessment, Western energy resource development.

This study is one part of a four volume progress report. The study area includes Arizona, Colorado, New Mexico, Montana, North Dakota, South Dakota, Utah, and Wyoming. The energy resources evaluated include coal, geothermal, natural gas, oil, oil shale, and uranium. The time frame extends from the present to the year 2000. This volume represents a first step in the identification, evaluation, and comparison of alternative policies and implementation strategies. The history of the U.S. energy policy system is reviewed, some major public and private sector participants are identified, and four energy policy subsystems are discussed. The principal problems and issues that public policymakers will be called on to resolve are discussed. Selected alternative policies are described, but a comprehensive evaluation of alternatives is left for the final report. The problems and issues singled out for attention are: water availability and quality; community services and facilities; air quality; Indians; and reclamation. Volume I provides a general description of the assessment results. Volume II presents more detailed analytical results on a site specific and regional basis. Volume IV contains two technical appendices, one covering alternative approaches to modeling air quality in areas with complex terrain, and one on energy transportation cost comparisons. (See also W78-00753, W78-00754, and W78-00756) (Nessa-NC)
W78-00755

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY DEVELOPMENT. VOLUME IV-APPENDICES,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
I. L. White, M. Rieber, S. L. Soo, F. S. La Grone, and M. A. Chatock.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 243, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-600/7-77-072d, July 1977. 125 p. 68-01-1916.

Descriptors: *Energy, *Technology, *Research and development, *Model studies, *Environmental effects, *Air pollution effects, *Coal, *Pipelines, *Cost comparisons, *Transportation, Statistical models, Analytical techniques, Terrain analysis, Economics, Extra

high voltage, Transmission(Electrical), Utah, Wyoming, South Dakota, North Dakota, New Mexico, Montana, Colorado, Arizona.
Identifiers: *Coal slurry pipelines, *Unit trains, *Extra high voltage transmission, *Gaussian Dispersion Model, Farmington(NM), Gillette(WY), Colstrip(MT), Kaiparowits(UT), Beulah(ND), Western energy resource development.

This study is one part of a four volume progress report. The study area include Arizona, Colorado, New Mexico, Montana, North Dakota, South Dakota, Utah, and Wyoming. The energy resources evaluated include, coal, geothermal, natural gas, oil, oil shale, and uranium. The time frame extends from the present to the year 2000. This volume consists of two technical appendices. The first addresses alternative approaches to modeling air quality in areas with complex terrain. Certain complex terrain modeling options for Steady State Gaussian dispersion equations were found to be the most suitable. The model used corrects for the problems caused by elevated, rugged terrain. It is also recognized that variability in topography and local dispersion meteorology among sites make it difficult to transfer modeling treatments from site to site. The second appendix assesses the comparative economics of three modes of coal energy transport. These include: unit trains, coal slurry pipelines, and extra high voltage transmission from mine mouth generating plants. Nine routes are analyzed, including Farmington, NM to Los Angeles, CA; Gillette, WY to Chicago, IL; Gillette, WY to houston, TX; Colstrip, MT to Houston, TX; Colstrip, MT to Seattle, WA; Colstrip, MT to Chicago, IL; Beulah, ND to Chicago, IL; and Kaiparowits, UT to Los Angeles, CA. (See also W78-00753, W78-00754, and W78-00755) (Nessa-NC)
W78-00756

APPLICATION OF NUMERICAL CLASSIFICATION IN ECOLOGICAL INVESTIGATIONS OF WATER POLLUTION,
Virginia Inst. of Marine Sciences, Gloucester Point, VA.
D. F. Boesch.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 604, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-600/3-77-033. March 1977, 114 p, 16 fig, 4 tab. R803599-01-1.

Descriptors: *Classification, *Systematics, *Water pollution, *Ecological distribution, *Analytical techniques, Methodology, Biological communities, Bioindicators, Water pollution effects, Aquatic environment, Distribution.
Identifiers: *Clustering, *Resemblance measures, *Species classification, *Species distribution, Numerical classification.

Numerical classification encompasses a variety of techniques for grouping entities based on the resemblance of their attributes according to mathematically stated criteria. In ecology this involves classification of collections representing sites or sampling periods, or classification of species. Classification can simplify patterns of collection resemblance or species distribution patterns. Procedures of numerical classification are reviewed, including data manipulations, computation of resemblance measures and clustering methods. The importance and effects of transformations and standardization are discussed. It is critical to choose an appropriate resemblance measure which best corresponds with the investigator's concept of ecological resemblance. Clustering methods form groups on the basis of patterns of inter-entity similarity. Various types of clustering methods exist but the most useful and best developed are those which are exclusive, intrinsic, hierarchical and agglomerative. Agglomerative clustering methods which distort spatial relationships and intensely cluster are frequently most useful with ecological data. The usefulness of numerical classification is demonstrated for objective analysis of the data sets resulting from field surveys and monitoring studies conducted for the assessment of pollution effects. Few pollution biologists have applied the more powerful classificatory techniques and post-clustering analyses. (Nessa-NC)
W78-00771

ENVIRONMENTAL ASSESSMENT PERSPECTIVES,
GCA Corp., Bedford, MA. GCA Technology Div.
For primary bibliographic entry see Field 5G.
W78-00773

CONNECTICUT RIVER BASIN SUPPLEMENTAL STUDY, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS AND CONNECTICUT. THE RIVER'S REACH. PHASE I. SOME ENVIRONMENTAL AND FLOOD PLAIN MANAGEMENT IMPLICATIONS OF THE CHANGING ROLE OF AGRICULTURE,
Economic Research Service, Broomall, PA.
For primary bibliographic entry see Field 4A.
W78-00774

OCEANS '77 CONFERENCE RECORD.
Institute of Electrical and Electronics Engineers, Inc., New York.; and Marine Technology Society, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-00827

PALAU: NATIVE PARADISE OR PETROLEUM SUPERPORT,
University of Southern California, Los Angeles. Inst. of Marine and Coastal Studies.
For primary bibliographic entry see Field 5C.
W78-00828

CEPEX HARDWARE: (NOW AND IN THE FUTURE),
Case Existological Labs. Ltd., Victoria (British Columbia).
For primary bibliographic entry see Field 5C.
W78-00837

PHYSICAL FACTORS AFFECTING THE SITING OF DREDGED MATERIAL ISLANDS,
Texas A and M Univ., College Station. Dept. of Geology.
For primary bibliographic entry see Field 5C.
W78-00838

HAWAII AND THE MANGANESE NODULE INDUSTRY,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
Q. D. Stephen-Hassard, and E. M. Grabbe.
In: 'Oceans '77', Proceedings of 3rd Annual Conference held in Los Angeles, CA on October 17-19, 1977, Vol 2 p HAWAII-B-1 - HAWAII-B-3, 1977. 4 ref.

Descriptors: *Manganese, *Mining, *Resources development, *Environmental effects, Waste disposal, Hawaii, Economical impact.
Identifiers: *Outer Continental Shelf, *Manganese nodule industry, Metal processing.

The State of Hawaii is located near the center of rich manganese nodule deposits containing nickel, copper and cobalt of commercial value. The State has followed early research, exploration and pilot mining activities of various companies and late in 1976 began a project to determine the economic feasibility and the socio-economic and environmental impacts of establishing a manganese nodule industry in Hawaii. The project will address the concerns of the people of Hawaii in these impact areas and will recommend a course of action. The University of Hawaii has been engaged in research, exploration, deep ocean mining tests and ocean environmental studies of manganese nodules during the past decade. The common interests of the State, the University of Hawaii and industry have led to several joint assessments. The project includes the following tasks: economic impact assessment, analysis of ocean transportation systems, analysis of processing systems, physical criteria and description of processing activities, metals extraction process chemistry, manpower supply and training, environmental law analysis, environmental evaluation, and waste disposal on land and agricultural potential of manganese nodule tailings. (See also W78-00827) (Sinha-OEIS)
W78-00839

OUTER CONTINENTAL SHELF DEVELOPMENT IN THE SANTA BARBARA CHANNEL: LACK OF DETECTABLE IMPACT ON FISHERIES,
For primary bibliographic entry see Field 5C.
W78-00867

ENVIRONMENTAL ASPECTS OF DRILLING MUDS AND CUTTINGS FROM OIL AND GAS EXTRACTION OPERATIONS IN OFFSHORE AND COASTAL WATERS,
Exxon Production Research Co., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-00868

INTEGRATED ENVIRONMENTAL STUDIES, SOUTH TEXAS OUTER CONTINENTAL SHELF: APPROACH, TECHNIQUES, RESULTS,
For primary bibliographic entry see Field 5G.
W78-00869

EVALUATION OF GEOLOGIC HAZARDS IN OCS PETROLEUM LEASE AREAS, SOUTHERN CALIFORNIA CONTINENTAL BORDERLAND,
For primary bibliographic entry see Field 5G.
W78-00870

AN EVALUATION OF LOUISIANA SUPERPORT STUDIES AND IMPLICATIONS FOR COASTAL ZONE MANAGEMENT,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5G.
W78-00871

7. RESOURCES DATA

7A. Network Design

DESIGN OF TREND MONITORING NETWORKS,
Washington Univ., Seattle. Center for Quantitative Science in Forestry, Fisheries, and Wildlife.
For primary bibliographic entry see Field 5A.
W78-00695

A BICENTENNIAL REFLECTION: STREAMGAUGING IN THE UNITED STATES,
Geological Survey, Reston, VA. Water Resources Div.
N. C. Matalas, and H. H. Barnes, Jr.
Hydrological Sciences Bulletin, Vol 22, No 1, p 41-59, March 1977. 11 fig, 5 tab, 4 ref.

Descriptors: *Streamflow, *Gaging stations, *Networks, *History, *Water resources development, *United States, Reviews, Programs, Projects, Network design, Data collections, Cost analysis, Spatial distribution.
Identifiers: Optimal gaging strategies.

A brief history of water-resources development in the United States is followed by a discussion of trends in the Geological Survey's gaging program. Operating stations increased from 200 in 1900 to about 8,000 in 1975 with a corresponding decrease in areal coverage per gage from 28,500 sq km to about 620 sq km. The dominance of complete gaging of streams over partial gaging stations declined from 95 percent to about 58 percent during this period. Effectively, the information yielded by the network is less than that measured by the accumulation of station years of record. Major floods and droughts, wars, fluctuations in the national economy, and other events which may be considered as random, have had a persistent impact on the program. Selection of gaging policy and strategy as an integral part of program planning (network design) is abetted by benefit-cost analysis. (Woodard-USGS)
W78-00809

7B. Data Acquisition

A POROUS CUP SOIL-WATER SAMPLER WITH VOLUME CONTROL,
Newfoundland Forest Research Centre, St. John's.
For primary bibliographic entry see Field 2G.
W78-00529

COMPARISON OF METHODS OF CALIBRATION OF A NEUTRON PROBE BY GRAVIMETRY OR NEUTRON-CAPTURE MODEL,
Grenoble-1 Univ. (France). Inst. de Mecanique.
For primary bibliographic entry see Field 2G.
W78-00679

A REGISTRATION UNIT FOR DRAIN OUTFLOW, GROUNDWATER DEPTH AND PRECIPITATION,
Institute for Land and Water Manage Research, Wageningen (Netherlands).
B. Van Der Weerd.
Journal of Hydrology, Vol. 34, No. 3/4, p 383-388, August 1977. 3 fig, 2 ref.

Descriptors: *Instrumentation, *Gages, *Equipment, Rain gages, Rainfall, Flowmeters, Flow measurement, Groundwater, Depth, Drainage, Surface drainage, Tile drainage, Discharge(Water), Data collection, On-site investigations.

A description was given of an operational field registration unit for open and submerged drain outflow, groundwater depth, and ranfall. The drain outflow meter has a measuring range from 20 to 400 cu cm/s, with a mean error in recorded sediment free outflow of 15% at flow rates below 60 cu cm/s and 1.5% at higher flow rates. Its weight is 6-8 kg, depending on the drain outlet it is adapted to, and it has a length of 90 cm and a height of 50 cm. The groundwater level meter has a measuring range of 1.25 m, but it can be adapted to deeper levels. Its accuracy is 0.5 cm when a float of 4.5 cm in a 5 cm diameter piezometer tube is used. Larger floats give higher accuracies. The transmission mechanism is housed in a 15 x 15 x 22 cm case to be placed on top of the piezometer tube. The raingage is a commercial pluviograph changed from mechanical to electrical registration. Rainfall is automatically syphoned off after every 10 mm of rainfall. The recorder is a commercial 6-point resistance recorder adapted to battery power (15 V from two wire-fence batteries). To save power, the electric registration paper transport system was replaced by a hand-wound 14-day clock. The channels normally are activated during 1 min each, giving one sweep in 6 min, but an added scanning system gives a choice in recording intervals. Recorder, power supply, and scanning system is built in a dust- and waterproof box. The maximum distance between meters and recorder is about 150 m. When larger distances are involved, the unit (total weight 37 kg) must be moved. (Sims-ISWS)
W78-00682

LIDAR OBSERVATIONS OF HIGH PLAINS THUNDERSTORM PRECIPITATION,
Wyoming Univ., Laramie. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W78-00687

SIGNIFICANCE OF VEGETATION IN INTERPRETING THERMAL RADIATION FROM A TERRESTRIAL SURFACE,
Florida Univ., Gainesville. Dept. of Fruit Crops.
R. A. Sutherland, and J. F. Bartholic.
Journal of Applied Meteorology, Vol. 16, No. 8, p 759-763, August 1977. 6 fig, 13 ref. NASA NAS10-8774.

Descriptors: *Remote sensing, *Temperature, *Radiation, *Vegetation, *Florida, Model studies, Mathematical models, Crops, Fruit crops, Soils, Aerial photography, Aircraft, Infrared radiation, Measurement.
Identifiers: Row crops, Thermal images, Emissivity, Cavity emissivity.

The regions between crop rows were modeled as infinitely long diffuse cavities. Geometrical view factors were calculated, accounting for reflected radiation emanating internal to the cavity and from the background sky. A 'cavity' emissivity dependent on local geometry was defined to allow for correcting apparent temperatures to true temperatures. The total emissivity appropriate for correcting aircraft thermal data was calculated then by averaging all emissivity components to account for soil, crop, and background. It was shown that even for the lowest crop and vegetation emissivity is greatly increased, giving rise to a decreased error in remotely sensed temperature data. (Sims-ISWS)
W78-00694

UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT AND WATER MANAGEMENT IN NORTH CAROLINA,
North Carolina State Univ. at Raleigh. Dept. of Geosciences.
C. W. Welby, and J. O. Lammi.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-18606, Price codes: A10 in paper copy, A01 in microfiche. Final Report, October 1975. 209 p, 42 fig, 16 tab, 32 ref. NASA NAS9-13321.

Descriptors: *Remote sensing, *Forests, *Land use, *Water resources, *North Carolina, Satellites(Artificial), Photography, Data processing, Agriculture, Vegetation, Hydrology, Geology, Evaluation, Analytical techniques.
Identifiers: *Skylab data.

S190A and S190B photographs of North Carolina taken during passes of SKYLAB-2 and SKYLAB-3 were studied as were data from the Multispectral Scanner, S192. Visual and optical techniques were employed during the investigation. Studies concentrated on the usefulness of the photography for land use inventories, for urban forestry studies, and for special problems related to land use. A skilled photo-interpreter can achieve a 90% or better accuracy for vegetative and land use interpretation, and for many problems the interpretation can be accomplished within a day or two. Acquisition of the data by other means can be much more time consuming. Agricultural monitoring in the coastal region may be accomplished more accurately and with greater facility than is presently possible if space-acquired imagery of SKYLAB detail were available consistently. Evaluation of the photographs showed limited usefulness of this data for geologic interpretation. Studies of the coastal inlets showed some potential usefulness in updating navigational charts and in developing understanding of the dynamics of the inlets. (Sims-ISWS)
W78-00715

RELATION BETWEEN EARTHQUAKES, WEATHER, AND SOIL TILT,
Geological Survey, Reston, VA. Geologic Div.
M. D. Wood, and N. E. King.
Science, Vol 197, No 4299, p 154-156, July 8, 1977. 3 fig, 24 ref.

Descriptors: *Earthquakes, *Forecasting, *Analytical techniques, *Numerical analysis, *Correlation analysis, Least squares method, Regression analysis, Weather, Rainfall, Temperature, Soils, Evaluation.
Identifiers: *Soil tilt.

Two years of local earthquake, temperature, and rainfall data taken near a tiltmeter site were used in a study of the numerical relation between these phenomena and the recorded tilt response. A least-squares shaping and predictive error filter approach was used. The relations were ranked in part according to the root mean square (r.m.s.) error of fit across the entire sample space. The tilt data with an annual range of tilt approximately 10 microradians were fitted to the combined weather data of temperature and rainfall with a 0.75-microradian r.m.s. error. The best fit of earthquakes to these same tilt data is the subclass of events with magnitude > 2.5 within 30 kilometers of the tilt site. The filter that mapped earthquakes to tilt yielded a 1.03-microradian r.m.s. error. The most unusual tilt anomaly over the entire 2-year period has the best fit of rainfall to the data for any single month of the entire data set. This unusual anomaly was the basis of an erroneously predicted earthquakes with magnitude about 5. These data indicate that if there are premonitory earthquake signals, they are buried in local meteorlogical noise. Separating an earthquake anomaly from the response to surface phenomena becomes more difficult as the earthquake anomaly lead time approaches the rise time of the soil to weather and seasonal variations. (Woodard-USGS)
W78-00823

7C. Evaluation, Processing and Publication

SUBROUTINE FOR SETTLING VELOCITIES OF SPHERES,
Water Resources Engineers, Inc., Walnut Creek, CA.
For primary bibliographic entry see Field 2J.
W78-00528

WATER CONDITIONS IN CALIFORNIA, BASIC DATA SUPPLEMENT.
California State Dept. of Water Resources, Sacramento. Snow Surveys Branch.
For primary bibliographic entry see Field 2B.
W78-00545

PRECIPITATION (RADAR) PROJECT OF THE IFYGL LAKE METEOROLOGY PROGRAM,
Center for the Environment and Man, Inc., Hartford, CT.
For primary bibliographic entry see Field 2B.
W78-00546

MONTHLY RAINFALL IN THE UPPSALA-FIELD,
Uppsala Univ. (Sweden). Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W78-00548

BAYESIAN MODEL DISCRIMINATION FOR BOD ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-00620

WATER QUALITY MODELING OF A HIGH MOUNTAIN STREAM,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
For primary bibliographic entry see Field 5B.
W78-00623

A MODEL FOR ACHIEVING CONSISTENCY FOR COST SHARING IN WATER RESOURCE PROGRAMS,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 6C.
W78-00626

AN ARCHETYPAL LINEAR PROGRAMMING MODEL FOR OPTIMAL INTERTEMPORAL ALLOCATION OF GROUNDWATER TO AGRICULTURAL ACTIVITIES,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.
W78-00629

HEURISTIC ALGORITHM FOR WASTE-WATER PLANNING,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W78-00630

A COMPUTER PROGRAM FOR MODELING OF WATER QUALITY PARAMETERS IN STEADY STATE MULTI-DIMENSIONAL NATURAL AQUATIC SYSTEMS, (SECOND EDITION),
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W78-00632

SNSIM1/2 'A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,'
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W78-00633

SIMULATION MODELS OF THE VELIKA MORAVA BASIN FOR DESIGN OF A MULTIPURPOSE RESERVOIR SYSTEM,
Institut za Vodoprivredu Jaroslav Cerni, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4A.
W78-00639

CHANCE CONSTRAINED MODEL OF WATER RESOURCES SYSTEMS,
Water Resources Development and Construction, Prague (Czechoslovakia).
For primary bibliographic entry see Field 4A.
W78-00641

GENERAL MARKOV MODEL FOR OPTIMAL CONTROL RESERVOIRS,
Polish Academy of Sciences, Warsaw. Inst. of Geophysics.
For primary bibliographic entry see Field 4A.
W78-00642

MULTIPLE OBJECTIVE OPTIMIZATION MODEL FOR REAL-TIME OPERATION OF A WATER SUPPLY SYSTEM,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 4A.
W78-00645

FLOOD PLAIN INFORMATION: COTTONWOOD CREEK, EL PASO COUNTY, COLORADO.
Army Engineer District, Albuquerque, NM.
For primary bibliographic entry see Field 4A.
W78-00757

SPECIAL FLOOD HAZARD INFORMATION REPORT: CONGAREE RIVER, BROAD RIVER, AND SALUDA RIVER, RICHLAND AND LEXINGTON COUNTIES, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
For primary bibliographic entry see Field 4A.
W78-00758

FLOOD PLAIN INFORMATION: STONEY BRANCH AND TRIBUTARIES, ROCK HILL, SOUTH CAROLINA.
Army Engineer District, Charleston, SC.
For primary bibliographic entry see Field 4A.
W78-00760

FLOOD PLAIN INFORMATION: EAST RIVER AND TRIBUTARIES, CITY OF GREEN BAY AND BROWN COUNTY, WISCONSIN.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-00761

FLOOD PLAIN INFORMATION: MENOMINEE RIVER--GREEN BAY, MARINETTE COUNTY, WI, MENOMINEE COUNTY, MI, CITIES OF MARINETTE, WI--MENOMINEE, MI.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-00762

FLOOD PLAIN INFORMATION: BEAVER CREEK AND TRIBUTARIES, VICINITY OF HUNTINGTON, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00763

NORTH FORK OBION RIVER, HOOSIER CREEK, AND GROVE CREEK, UNION CITY, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00764

FLOOD PLAIN INFORMATION: SUGAR CREEK, LITTLE NIXON CREEK, AND TRIBUTARIES, VICINITY OF BROWNSVILLE, TENNESSEE.
Army Engineer District, Memphis, TN.
For primary bibliographic entry see Field 4A.
W78-00765

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, ASHLAND CITY, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00766

FLOOD PLAIN INFORMATION: CUMBERLAND RIVER, CANEY FORK RIVER, CARTHAGE, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00767

FLOOD PLAIN INFORMATION: SULPHUR FORK, SPRINGFIELD, TENNESSEE.
Army Engineer District, Nashville, TN.
For primary bibliographic entry see Field 4A.
W78-00768

FLOOD PLAIN INFORMATION: BLACK EARTH CREEK, DANE COUNTY, WI-VILLAGES OF MAZOMANIE, BLACK EARTH, AND CROSS PLAINS.
Army Engineer District, St. Paul, MN.
For primary bibliographic entry see Field 4A.
W78-00769

FLOOD PLAIN INFORMATION: NORTH NASHUA RIVER, FITCHBURG, AND LEOMINSTER, MASSACHUSETTS.
Army Engineer District, Waltham, MA.
For primary bibliographic entry see Field 4A.
W78-00770

MAPS SHOWING GROUND-WATER CONDITIONS IN THE NORTHERN PART OF THE CHINLE AREA, APACHE COUNTY, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
G. W. Levings, and C. D. Farrar.
Water-Resources Investigations 77-35 (open-file report), April 1977. 2 sheets, 7 ref.

Descriptors: *Groundwater resources, *Maps, *Aquifers, *Water table, *Water quality, Hydrogeology, Arizona.
Identifiers: *Navajo Indian Reservation(Ariz), *Apache County.

The northern part of the Chinle area includes about 3,000 sq mi in northeastern Arizona and is entirely in the Navajo Indian Reservation. The main source of water is from the several aquifers that are made up of one or more formations. The aquifers are stacked one on the other and generally are not hydraulically connected. Information on the maps includes depth to water, altitude of the water level, and chemical quality of the water. Scale 1:125,000. (Woodard-USGS)
W78-00802

MAPS SHOWING GROUND-WATER CONDITIONS IN THE MONUMENT VALLEY AND NORTHERN PART OF THE BLACK MESA AREAS, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
G. W. Levings, and C. D. Farrar.
Water-Resources Investigations 77-44 (open-file report), May 1977. 3 sheets, 7 ref.

Descriptors: *Groundwater resources, *Maps, *Aquifers, *Water table, *Water quality, Hydrogeology, Indian reservations, Arizona.
Identifiers: *Northern Black Mesa area(Ariz), Navajo County, Apache County, Coconino County.

The Monument Valley and the northern part of the Black Mesa areas include about 2,700 sq mi in northeastern Arizona and are entirely in the Navajo and Hopi Indian Reservations. The main source of water is from the several aquifers that are made up of one or more formations. The aquifers are stacked one on the other and generally are not hydraulically connected. Information on the maps includes depth to water, altitude of the water level, and chemical quality of the water. Scale 1:125,000. (Woodard-USGS)
W78-00803

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SOUTHERN PART OF THE

BLACK MESA AREA, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA--1976,
Geological Survey, Tucson, AZ. Water Resources Div.
G. W. Levings, and C. D. Farrar.
Water-Resources Investigations 77-41 (open-file report), May 1977. 3 sheets, 7 ref.

Descriptors: *Groundwater resources, *Maps, *Aquifers, *Water table, *Water quality, Hydrogeology, Indian reservations, Arizona.
Identifiers: *Southern Black Mesa area(Ariz), Navajo County, Apache County, Coconino County.

The southern part of the Black Mesa area includes about 2,500 sq mi in northeastern Arizona and is entirely in the Navajo and Hopi Indian Reservations. The main source of water is from the several aquifers are stacked one on the other and generally are not hydraulically connected. Information on the maps includes depth to water, altitude of the water level, and chemical quality of the water. Scale 1:125,000. (Woodard-USGS)
W78-00804

JARRETTSVILLE QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
L. J. Nutter.
Maryland Geological Survey, (Baltimore), Quadrangle Atlas No 5, 1977. 4 maps, 2 fig, 8 ref.

Descriptors: *Maps, *Hydrogeology, *Groundwater, *Water table, *Groundwater availability, Maryland, Water supply, Land use, Planning, Water pollution control, Septic tanks.
Identifiers: Harford County(Md), *Jarrettsville quadrangle.

The Jarrettsville quadrangle in Harford County, Md., is underlain by metamorphosed sedimentary and igneous rocks. Water is stored in and transmitted through an interconnecting system of fractures in the rock and in the saturated part of the overlying saprolite. Much of the rapidly expanding suburban development is in areas not served by public-water and sewage systems. Accordingly, many of the new housing subdivisions must rely on individual wells and septic systems, with some risk of contamination of the water supply. This atlas provides maps intended for use by planners to assist with land-use planning and to help minimize potential environmental problems. The maps include data concerning: (1) Depth to water table, (2) slope of land surface, (3) ground-water availability, and (4) constraints on installation of septic systems. (Woodard-USGS)
W78-00805

BEL AIR QUADRANGLE HYDROGEOLOGY,
Geological Survey, Towson, MD. Water Resources Div.
L. J. Nutter.
Maryland Geological Survey, (Baltimore), Quadrangle Atlas No 6, 1977. 4 maps, 1 fig, 8 ref.

Descriptors: *Maps, *Hydrogeology, *Groundwater, *Water table, *Groundwater availability, Maryland, Water supply, Land use, Planning, Water pollution control, Septic tanks.
Identifiers: Harford County(Md), *Bel Air quadrangle.

The Bel Air quadrangle in Harford County, Md., is underlain by metamorphosed sedimentary and igneous rocks. Water is stored in and transmitted through an interconnecting system of fractures in the rock and in the saturated part of the overlying saprolite. Much of the rapidly expanding suburban development is in areas not served by public-water and sewerage systems. Accordingly, many of the new housing subdivisions must rely on individual wells and septic systems, with some risk of contamination of the water supply. This atlas provides maps intended for use by planners to assist with land-use planning and to help minimize potential environmental problems. The maps include data concerning: (1) Depth to water table, (2) slope of land surface, (3) ground-water availability, and (4) constraints on installation of septic systems. (Woodard-USGS)
W78-00806

CLASSIFICATION OF THE HYDROLOGIC SETTINGS OF LAKES IN THE NORTH CENTRAL UNITED STATES,
Geological Survey, Denver, CO. Water Resources Div.
For primary bibliographic entry see Field 2H.
W78-00808

A BICENTENNIAL REFLECTION: STREAM-GAUGING IN THE UNITED STATES,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7A.
W78-00809

WATER RESOURCES DATA FOR OREGON, WATER YEAR 1975.
Geological Survey, Portland, OR. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 153, Price codes: A99 in paper copy, A01 in microfiche. Water-Data Report OR-75-1, May 1976. 386 p, 5 fig, 3 tab, 20 ref.

Descriptors: *Oregon, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Water resources, Water temperature, Gaging stations, Streamflow, Flow rates, Water wells, Water levels, Lakes, Reservoirs, Sampling, Sites, Water analysis, Chemical analysis, Sediments.

Water resources data for the 1975 water year for Oregon consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 300 gaging stations; stage only records for 8 gaging stations; stage and contents for 40 lakes and reservoirs; water quality for 83 gaging stations, and water levels for 103 observation wells. Also included are 178 crest-stage partial-record stations and 12 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. these data represent that part of the National Water Data System operated by the U.S. Geological Survey and Cooperating State and Federal agencies in Oregon. (Woodard-USGS)
W78-00817

WATER RESOURCES DATA FOR MARYLAND AND DELAWARE, WATER YEAR 1976.
Geological Survey, Towson, MD. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 724, Price codes: A16 in paper copy, A01 in microfiche. Water-Data Report MD-DE-76-1, June 1977. 351 p, 4 fig.

Descriptors: *Maryland, *Delaware, *Hydrologic data, *Surface waters, *Groundwater, Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 year for Maryland and Delaware consist of records of stage, discharge, and water quality of streams; stage, content, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 107 gaging stations; stage and contents for 1 reservoir; water quality for 54 gaging stations and 91 wells; and water levels for 29 observation wells. Also included are data for 54 low-flow partial-record stations, 45 crest-stage partial-record stations, and 4 tidal crest-stage partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Maryland and Delaware. (Woodard-USGS)
W78-00818

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1976.
Geological Survey, Bismarck, ND. Water Resources Div.
Geological Survey Water-Data Report ND-76-1, July 1977. 602 p, 6 fig.

Descriptors: *North Dakota, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for North Dakota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells. This report contains discharge records for 134 gaging stations, stage and contents for 13 lakes and reservoirs; water quality for 51 gaging stations, 3 partial-record flow stations, 12 lakes, 21 wells; and water levels for 32 observation wells. Also included are 5 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in North Dakota. (Woodard-USGS)
W78-00819

SIMULATION OF VELOCITY DISTRIBUTION AND MASS TRANSFER,
Geological Survey, Denver, CO. Water Resources Div.
For primary bibliographic entry see Field 2J.
W78-00825

ALLUVIAL CHANNEL BEDFORMS,
Geological Survey, Denver, CO. Water Resources Div.
For primary bibliographic entry see Field 2J.
W78-00826

8. ENGINEERING WORKS

8A. Structures

SPILLWAY AND STILLING BASIN FOR LOOKOUT POINT DAM, MIDDLE FORK WILLAMETTE RIVER, OREGON: HYDRAULIC MODEL INVESTIGATIONS,
Army Engineer District, Bonneville, OR. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W78-00549

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS,
Water Resources Engineers, Springfield, VA.

For primary bibliographic entry see Field 8B.
W78-00699

OUTLET WORKS AND STILLING BASIN, HOWARD HANSON DAM, GREEN RIVER, WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS,
Army Engineer Div. North Pacific, Bonneville, OR. Hydraulics Lab.
For primary bibliographic entry see Field 8D.
W78-00705

POSSIBLE FAILURE OF THE LOW-SILL CONTROL STRUCTURE AT OLD RIVER, LOUISIANA, ECONOMIC AND PHYSICAL CONSEQUENCES,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-00719

8B. Hydraulics

CRITICAL REYNOLDS NUMBER FOR ORIFICE AND NOZZLE FLOWS IN PIPES,
Indian Inst. of Science, Bangalore. Dept. of Civil Engineering.
N. S. L. Rao, K. Sridharan, and S. H. Alvi.
Journal of Hydraulic Research, Vol. 15, No. 2, p 167-178, 1977. 11 fig, 1 tab, 11 ref.

Descriptors: *Reynolds number, *Turbulent flow, *Orifices, *Pressure head, Hydraulics, Nozzles, Head loss, Pipe flow, Discharge coefficient, Laminar flow.
Identifiers: *Pressure recovery length, Piezometric head, Critical Reynolds number.

The critical Reynolds number at which the flow downstream of an orifice or nozzle in a pipe becomes turbulent is an important parameter as it is the demarcating point between purely laminar flow and relaminarising flow. The value of the critical Reynolds number was estimated for sharp-edged orifices, quadrant-edged orifices and long radius nozzles from indirect evidences using mean flow measurements. Different criteria were considered, such as the variations of coefficient of discharge, loss coefficient, loss as percentage of piezometric head differential across the meter, and presure recovery length downstream of the orifice. The criteria identify a range of transition Reynolds number for different orifices and nozzles. The critical orifices Reynolds number was seen to approach a constant value for low values of orifice or nozzle diameter to pipe diameter ratio. The critical Reynolds number increases gradually with increase in edge radius, with the nozzle having the highest value. (Singh-ISWS)
W78-00525

ARMORING PROCESS IN DEGRADING STREAMS,
Mosul Univ. (Iraq). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W78-00527

SUBROUTINE FOR SETTLING VELOCITIES OF SPHERES,
Water Resources Engineers, Inc., Walnut Creek, CA.
For primary bibliographic entry see Field 2J.
W78-00528

SPILLWAY AND STILLING BASIN FOR LOOKOUT POINT DAM, MIDDLE FORK WILLIAMETTE RIVER, OREGON: HYDRAULIC MODEL INVESTIGATIONS,
Army Engineer District, Bonneville, OR. Hydraulic Lab.
L. Z. Perkins.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A000 314, Price codes: A06 in paper copy, A01 in microfiche. Technical Report No. 42-1, December 1962. 109 p, 61 fig, 15 tab, 2 ref, 1 append.

Descriptors: *Dams, *Oregon, *Spillways, *Settling basins, *Model studies, Hydraulic models, Structures, Hydraulic structures, Spillway crests, Gates, Spillway gates, Diversion tunnels, Concrete structures, Flow, Flow control, Discharge(Water), Outlet works, Fluid mechanics, Hydraulics, Civil engineering.
Identifiers: *Lookout Point Dam(Ore), *Willamette River.

Model investigations for Lookout Point Dam were concerned with the hydraulic performance of the spillway and stilling basin, regulating outlets, and outlet channel. Two undistorted models were used in the principal investigations: (1) a 1:72-scale general model, and (2) a model of a single regulating outlet constructed to scale ratios of 1:16 and then 1:19.2 (the model scale was changed to compensate for enlargement of outlets). Supplemental tests to determine the hydraulic effects of H-beams half-embedded in the spillway pier noses were made on a 1:33-scale sectional model of the spillway for Chief Joseph Dam. The H-beams were proposed for use as emergency gate guides at Lookout Point Dam. Tests in the general model indicated that although performance of the original spillway and stilling basin was satisfactory, certain alterations could be made to improve hydraulic efficiency or reduce construction costs. Hydraulic and economic considerations made it necessary to redesign the spillway crest, to reduce the number and to increase the size of the regulating outlets, and to install an eyebrow-shaped deflector over the exit of each outlet. It was determined that flow conditions and pressures over the revised spillway were satisfactory for all discharges that were reproduced for study. The final design stilling basin and outlet channel provided good energy dissipation for spillway flows to 180,000 cfs (2.07 times the flood of record, 87,000 cfs). (Sims-ISWS)
W78-00549

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS,
Water Resources Engineers, Springfield, VA.
M. T. Tseng, J. L. Matticks, and B. Black.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 084, Price codes: A02 in paper copy, A01 in microfiche. Contract Report No. FHWA-RD-75-55, August 1974. 18 p, 4 fig, 2 tab. DOT-FH-11-7669.

Descriptors: *Flood flow, *Risks, *Bridge design, *Engineering, Hydrologic aspects, Model studies, Decision making, Dikes, Economics, Evaluation.
Identifiers: *Bridge opening, Stream crossing, Spur dike models.

This is the fifth in a series of five volumes comprising the final report of the Federal Highway Administration sponsored study of the above title. The objective was to develop an engineering systems analysis method to enhance the decision-making process for highway stream crossing design. The method applies economic risk techniques as well as standard hydraulic and hydrologic factors in the design of bridge waterways. Test data from experiments with spur dike models were included in this report. Elliptic and logarithmic spur types were tested. Velocities and depths were measured along the model face and across the bridge opening for 2 flow rates. The tests were conducted under fixed-bed conditions. (Singh-ISWS)
W78-00699

FINITE ELEMENT ANALYSES OF STRESSES AND MOVEMENTS IN BIRCH DAM,
California Univ., Berkeley. Office of Research Services.
For primary bibliographic entry see Field 8D.
W78-00701

GEOMORPHOLOGY, SHALLOW SUBBOTTOM STRUCTURE, AND SEDIMENTS OF THE ATLANTIC INNER CONTINENTAL SHELF OFF LONG ISLAND, NEW YORK,
Coastal Engineering Research Center, Fort Belvoir, VA.
S. J. Williams.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 467, Price codes: A06 in paper copy, A01 in microfiche. Technical Report 76-2, March 1976. 123 p, 30 fig, 4 tab, 88 ref, 2 append.

Descriptors: *Geomorphology, *Atlantic Coastal Plain, *Continental shelf, *New York, Beaches, Sedimentation, Sediments, Geology, Seismic studies, Hydrology.
Identifiers: *Long Island(NY), *Atlantic Inner Shelf, Seismic reflection, Beach nourishment.

About 800 sq mi of the Atlantic Inner Continental Shelf off Long Island, New York, were studied by CERC to obtain information on the sea floor morphology, sediment distribution, and shallow subbottom stratigraphy and structure. Three primary acoustic horizons are evident on the seismic profiles and have been identified by correlation with cores, land borings, and surface exposures of the reflectors. Granitic bedrock is the oldest and deepest horizon underlying Long Island, but its recognition on the seismic records, due to limited subbottom penetration, is confined to northern Gardiners Bay. The bedrock surface slopes southeast and exhibits considerable relief where glacial ice has enlarged pre-Pleistocene drainage channels. Upper Cretaceous and Tertiary semiconsolidated clastic sediments overlie the bedrock and dip and thicken to the southeast. Surficial sediments on the inner shelf are primarily fine-to-medium quartz sand with secondary occurrences of coarse sand and pea gravel on the Atlantic shelf and silt-clay mixtures in the Gardiners Bay region. Much of the surficial sand on the inner shelf is suitable as fill for beach restoration, except for that of the shoreface region (0 to -30 ft MSL) which contains fine sand and that of major parts of Gardiners Bay which contain organic-rich silt and clay. Topographic highs on the sea floor in the form of linear shoals, and broad deltalike platforms in eastern Long Island appear most suitable for sand recovery. The sea floor in most potential borrow areas is flat, and sand occurs as blanket deposits. Potential sand reserves within about 12 ft of the sea floor in the region are estimated to be more than 8 billion cubic yards. (Lee-ISWS)
W78-00704

TWO-DIMENSIONAL MODEL FOR TWO-LAYER FLOW,
Thessaloniki Univ., Salonika (Greece) Dept. of Civil Engineering.
G. J. Balafoutas, and M. B. Abbott.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers. Vol. 103, No. EM5, Proceedings Paper 13263, p 789-806, October 1977. 8 fig, 1 tab, 13 ref.

Descriptors: *Density currents, *Model studies, *Flow, Hydrodynamics, Mathematical models, Stratified flow, Waves(Water), Hydraulics, Equations.
Identifiers: Cross-convective mass.

A two-dimensional, two-layer, nearly-horizontal flow was solved by the method of characteristics. In the computational model, the two-dimensional field was divided in parallel channels, and the two-dimensional flow was replaced by two series of one-dimensional canalized flows. For a more

realistic application of the model, a dissipative interface and an 'accentuating interface' were proposed. The cross-convective terms were introduced into the model numerically. Finally, some computational results were mentioned. (Lee-ISWS)
W78-00713

HYDRODYNAMIC PRESSURE IN SEMICYLINDRICAL RESERVOIR,
Universidad Nacional Autonoma de Mexico, (Mexico). Inst. de Ingenieria.
F. J. Sanchez-Sesma, and E. Rosenblueth.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers, Vol. 103, No. EM5, Proceedings Paper 13298, p 913-919, October 1977. 4 fig, 3 tab, 10 ref.

Descriptors: *Dam design, *Dams, *Hydrodynamics, *Reservoirs, Pressure, Earthquakes, Hydraulics, Cross-sections, Analysis, Seismic studies, Equations, Shape.
Identifiers: Moments, Overturning tests, Thrust, Semicylindrical reservoirs.

Solutions were presented for modal analysis of hydrodynamic pressures generated by the 3 translational seismic components, longitudinal, vertical, and transverse, on a dam limiting a semicircular cylindrical reservoir. The main purpose was to show the influence of the cross-sectional shape of the reservoir in the hydrodynamic responses. Results were compared with those for rectangular cross section. Responses were found to be systematically smaller with semicircular cross section for a given cross-sectional area and depth. It was concluded that for design purposes the fundamental mode adequately approximates the response for various excitations of practical interest. (Lee-ISWS)
W78-00714

MODEL STUDY OF THE INLET AND SUMP ON THE CLINTON FIRST AVENUE PUMP STATION,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 8C.
W78-00717

REVIEW OF C.E. JACOB'S DOUBLET WELL,
G. Wickersham.
Ground Water, Vol 15, No 5, p 344-347, September-October 1977. 2 fig, 9 ref.

Descriptors: *Patents, *Saline water barriers, *Wells, *Saline water intrusion, Water levels, Groundwater, Freshwater, Skimming, Brine disposal, Oil wells, Oil-water interfaces, Injection wells, Equipment, Pumps, Pumping, Reviews, History.
Identifiers: *Doublet wells, Coning, Packers.

C.E. Jacob, noted hydrologist, received patents on his doublet well invention in 1965. Due to his death soon thereafter, no paper was written or published describing his invention. The purpose of this paper is to stir interest in in his original doublet theory and to make known a technique that can be useful to hydrologists. Jacob's patents are for a single location doublet well that produces freshwater or petroleum from underground reservoir formations without contamination by underlying heavier liquid. By use of packers, water is pumped from one horizon and discharged into a different horizon. A closed cell is created whereby the heavier liquid is recirculated below the streamline boundary, while lighter fluid passes into the well and is raised to the surface. The doublet well as proposed by Jacob has the potential to increase the usefulness of groundwater. It permits a greater rate of production of the lighter liquid than previously possible. It is applicable to saline intrusion and oil vs brine situations. The single doublet is also a possible mechanism for the groundwater heat pump. (Visocky-ISWS)
W78-00720

EYEBROOK RESERVOIR SIPHON SPILLWAY - PAPER II,
G. C. S. Oliver.
Journal of the Institution of Water Engineers and Scientists, Vol 30, No 1, p 35-42, February 1976. 2 fig, 1 tab.

Descriptors: *Spillways, *Siphons, *Hydraulic structures, *Reservoirs, Discharge(Water), Flood control, Closed conduits, Prototypes, Prototype tests, Flow control, Water levels, Reservoir operation, Flow characteristics, Hydraulics, Foreign countries.
Identifiers: *England, *Eyebrook Reservoir Siphon Spillway.

A paper, 'Eyebrook Reservoir Siphon Spillway', was given to the Institution on 5 December 1958, and published in the Journal of the Institution of Water Engineers, Vol. 13, No. 3, May 1959. Described in the paper was the conversion in 1955 of a bellmouth spillway into a siphon spillway in order to raise safely the top water level of the reservoir by 2'6 without heightening the dam. The capacity of the reservoir was increased by 250 million gallons. The paper described in detail the results on a 1/5 in scale model of a single Eyebrook siphon. A few details of the actual siphons in operation were given in the discussion. The purpose of the 1976 paper was to give further details of the siphons in operation during the last 20 years and to discuss the implications learned. The total discharge capacity of the spillway is 4000 cfs. Each siphon was designed to pass a maximum of 250 cfs. Ten different floods have resulted in the spillway discharging, under siphonic conditions, flow of from 350 to 1,250 cusecs. The difference in reservoir water levels over the varying flows has been less than 1 in. There has been no unnecessary flooding below the Dam as the first siphon does not start to operate until the water level in the reservoir rises 0.65 ft above the overflow. The discharge is controlled then with very little further rise in reservoir water level. (Humphreys-ISWS)
W78-00743

1974 FLOATING BREAKWATERS CONFERENCE PAPERS.
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
Available from the National Technical Information Service, Springfield, VA 22161 as COM74-11637, Price codes: A00 in paper copy, A01 in microfiche. Marine Technical Report Series No. 24, 1974. 302 p. Papers presented at Floating Breakwaters Conf. held at Newport, RI, April 23-25, 1974. Co-sponsored by Rhode Island and Washington Universities, Kowalski, T. (Ed.). NOAA-SG-04-3-158-3.

Descriptors: *Conferences, *Resources development, Bibliographies, *Water pollution control, Environmental effects, Shore protection, Breakwaters, Coastal structures, Construction materials, Harbors, Marinas, Beach erosion.
Identifiers: Coastal zone, Resources management, Floating breakwaters, Wave attenuation, Scrap tires.

The 18 papers given at the Floating Breakwater Conference held in Newport, Rhode Island, April 23-25, 1974 are presented. Titles included: Floating Breakwaters--State of the Art; Theoretical Analysis of Floating Breakwater Performance; The Effect of Surge, Heave and Pitch on the Performance of a Floating Breakwater; Tethered Float Breakwaters; The Performance of an Offset Breakwater Configuration in Wind-generated Waves; A Wave Barrier Concept; Development of Hermaphrodite Breakwater Units Utilizing Hydrofoils in Specific Arrangement; Attenuation of Wind-generated Deep Water Waves by Pneumatic and Hydraulic Breakwaters; Prototype Performance Characteristics of a Floating Breakwater; The 'Seabreaker' Floating Breakwater; Goodyear Scrap Tire Floating Breakwater Concepts; The Harris Floating Breakwater; Scrap Tire Floating Breakwaters; Materials and Construction Techniques for Floating Breakwaters; Practical Applications of Floating Breakwates for Small Craft Harbors; Workshop I: Future Uses of Floating Breakwaters; Workshop II: Floating Breakwaters for Small Boat Marinas; and A Chronological Survey of the Literature on Transportable and Floating Breakwaters. (Sinha-OEIS)
W78-00840

THEORETICAL ANALYSIS OF FLOATING BREAKWATER PERFORMANCE,
Washington Univ., Seattle. Dept. of Mechanical Engineering.
B. H. Adee, and W. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-02, Price codes: A02 in paper copy, A01 in micro

Descriptors: *Breakwaters, *Engineering structures, *Barriers, *Coastal structures, Shore protection, Estuaries, Water pollution control, Models, Resources development, Environmental effects.
Identifiers: *Floating breakwaters, *Boundary-value problems, Incident waves, Coastal zone, Resources management.

The problem of computing the response of a floating-breakwater systemaacted upon by incident waves is considered. A theoretical, linear model is developed based on the assumptions of deep water, an inviscid fluid, irrotational fluid flow, small incident waves and small breakwater motions. The breakwater is assumed to be long and uniform in the direction parallel to the incident wave crests. These assumptions permit the formulation of a set of coupled, linear, second-order differential equations for the breakwater sway, heave and roll motions. The solutions to four similar boundary-value problems for the velocity potential permit the computation of the exciting forces and hydrodynamic coefficients required in the equations of motion. The diffracted and breakwater-motion generated wave fields are obtained from the solution of the boundary-value problems. Computer-calculated breakwater system response is compared with experimentally obtained data for a breakwater of rectangular cross section. Although there are some discrepancies, the theoretical model provides reasonable predictions of the transmitted waves and breakwater motions. (See also W78-00840) (Sinha-OEIS)
W78-00842

PROTOTYPE PERFORMANCE CHARACTERISTICS OF A FLOATING BREAKWATER,
Washington Univ., Seattle. Ocean Engineering Research Lab.
D. R. Christensen, and E. P. Richey.
Available from the National Technical Information Service, Springfield, VA 22161 as COM74-1163709, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 159-179, 1974. 20 fig, 6 ref. Presented at Floating Breakwaters Conference held Newport, RI, April 23-25, 1974.

Descriptors: *Breakwaters, *Harbors, *Engineering structures, *Coastal structures, Hydraulic structures, Alaska, Storms, Environmental effects, Water pollution control, Resources development.
Identifiers: *Floating breakwaters, Wave effects, Coastal zone, Resources management.

The characteristics, i.e., transmission coefficients anchor forces, and accelerations in heave, roll, and sway are evaluated from measurements taken on a floating breakwater protecting a small boat harbor at Tenakee Springs, Alaska. The breakwater consists of series-connected modules of

lightweight, post-tensioned, styrofoam filled concrete. The modules, in planform, are 21 ft x 60 ft open rectangles with a three foot perimeter and draft about 3 ft of their 5-ft vertical dimension. The field measurements were planned with the combined purpose of evaluating a particular type of breakwater under different wave exposures and to supply basic data for the verification and development of a theoretical predictive model for breakwater performance. The instrumentation was designed with multiple-channel, digital recording capability and packaged for use in remote locations, requiring only periodical maintenance checks and tape changes. The system can be set to be actuated at a selected wind speed and to sample the various input sensors at prescribed intervals and durations of time. (See also W78-00840) (Sinha-OEIS)
W78-00849

THE 'SEABREAKER' FLOATING BREAKWATER,
National Research Development Corp., London (England).
H. G. Haslet.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-10, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 181-191, 1974. 4 fig. Presented at Floating Breakwaters Conference held Newport, RI, April 23-25, 1974.

Descriptors: *Breakwaters, *Engineering structures, *Coastal structures, *Resources development, Water pollution control, *Environmental effects, Harbors, Hydraulic structures, Swell.
Identifiers: *Floating breakwaters, *Seabreakers, *Wind-generated waves, Design wave, Wave attenuation, Coastal zone, Resources management.

The concept of using a long, stiff horizontal surface for wave attenuation evolved during flume tests in 1963. Each unit is a long, rigid pontoon of specialized design, with a universal joint at either end enabling a string of units to be joined together. It may be used in four different ways: permanently moored, temporarily moored, crawling, or full mobile. Possible uses are discussed, together with the practical problems that have been faced. Advantages of the design include shallow draft, light weight, modest mooringk loads even in strong currents, east of towing or self-propulsion, ability to take the ground or be winched up a beach, seaworthiness under overload conditions, and provision for catwalk, daymarks, lights, and refuge. Over 60% attenuation of wave height is claimed in wind-driven waves or steep swell, up to the size of the Design Wave for that particular unit. (See also W78-00840) (Sinha-OEIS)
W78-00850

THE HARRIS FLOATING BREAKWATER,
A. J. Harris, and J. M. Thomas.
Available from the National Technical Information Service Springfield, VA 22161 as COM-74-11637-12, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 213-232, 1974. 18 fig. Presented at Floating Breakwaters Conference held Newport, RI, April 23-25, 1974.

Descriptors: *Breakwaters, *Harbors, *Marinas, *Engineering structures, *Coastal structures, Water pollution control, Environmental effects, Resources development.
Identifiers: *Floating breakwaters, Wave energy, Moorings, Deep-sea freighters, Coastal zone, Resources management.

A basic feature of the Harris Breakwater (and the difference between it and the Bombardon) is that it presents a thin horizontal barrier to wave motion and causes dissipation of wave energy without creating major stresses in the structure and moorings. Extensive tests were carried out in the Solvent on a one-tenth scale model. The test confirmed earlier opinion, and because test readings co-related the structural characteristics and natural sea-state conditions, basic design formulas were established and the calculations checked against actual results. The application of the Harris Breakwater has been extended from marinas to the protection of moorings for deep sea freighters and, combined with the S.B.M., for super-tankers. Other uses are related to flexibility, mobility and lack of effect on existing currents and on the seabed. (See also W78-00840) (Sinha-OEIS)
W78-00852

SCRAP TIRE FLOATING BREAKWATERS,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
T. Kowalski.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-13, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 233-246, 1974. 13 fig, 4 ref. Presented at Floating Breakwaters Conference held Newport, Rhode Island, April 23-25, 1974.

Descriptors: *Breakwaters, *Construction materials, *Engineering structures, Coastal structures, Ocean waves, Waves(Water), Water pollution control, Environmental effects, Resources development.
Identifiers: *Floating breakwaters, Wave attenuation, Scrap tires, Coastal zone, Resources management.

Tests indicate that even a simple three-tire-deep mat has a wave suppression efficiency of approximately 70% in waves of significant height of 2.5 ft. Problems were encountered with the strapping materials used which proved inadequate when subjected to continuous twisting action. Better protection is also needed for the foam used for buoyancy. Recommendations are given for the improved methods of construction, foaming of tires for buoyancy and the materials used for tying the tires together. Suggestions are presented for the improvement of the efficiency of wave attenuation by considering the details of the configuration of the leading edge, main body and the trailing edge of the breakwater. (See also W78-00840) (Sinha-OEIS)
W78-00853

MATERIALS AND CONSTRUCTION TECHNIQUES FOR FLOATING BREAKWATERS,
Alaska Div. of Water and Harbors, Juneau.
D. S. Miller.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-14, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 247-261, 1974. 2 ref. Presented at Floating Breakwaters Conference held Newport, RI, April 23-25, 1974.

Descriptors: *Breakwaters, *Construction materials, *Engineering structures, *Coastal structures, *Resources development, Water pollution sources, Environmental effects, Concretes, Prestressed concrete, Steel, Elastomers, Flotation.
Identifiers: *Floating breakwaters, Timber, Coastal zone, Resources management.

The type of materials used for floating breakwaters, their fabrication and final assembly in the chosen location can be more important than the theoretical configuration. Materials used must be durable and corrosion resistant, withstand impact and fatigue stresses, be unsusceptible to damage from freezing and temperature fluctuations. Various material choices such as steel, timber, reinforced and prestressed concrete with emphasis on the type of concrete which has been proven durable as well as reinforcing and prestress steel properties, are commented on. All consideration is from the practical standpoint of marine construction and its special problems. Types of moorage and materials which can be utilized are discussed as is the very real problem of location and installation in what must be assumed as adverse weather and poor foundations. (See also W78-00840) (Sinha-OEIS)
W78-00854

PRACTICAL APPLICATIONS OF FLOATING BREAKWATERS FOR SMALL CRAFT HARBORS,
Alaska Div. of Water and Harbors, Juneau.
D. S. Miller.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-15, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 263-277, 1974. 15 fig. Presented at Floating Breakwaters Conference, held Newport, Rhode Island, April 23-25, 1974.

Descriptors: *Breakwaters, *Harbors, *Coastal structures, *Engineering structures, *Environmental effects, Water pollution sources, Resources development, Design criteria, Economics, Alaska.
Identifiers: *Floating breakwaters, Coastal zone, Resources management.

The application and limitations of floating breakwaters for small craft harbors are analyzed. Recommendations are proffered for the use of this type of harbor protection. The development of a structure to suite the economics and needs of the State of Alaska is described. Three projects utilizing the same basic configuration were completed. Various types of anchoring, connections, and design details were utilized. User acceptance and future users are explained. (See also W78-00840) (Sinha-OEIS)
W78-00855

WORKSHOP I: FUTURE USES OF FLOATING BREAKWATERS.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-16, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 279-290, 1974. From the Floating Breakwaters Conference held at Newport, Rhode Island, April 23-25, 1974.

Descriptors: *Breakwaters, *Harbors, Engineering structures, *Resources development, *Water pollution sources, Environmental effects, Beach erosion, Swimming, Ports, Nuclear powerplants.
Identifiers: *Floating breakwaters, Seaplane airports, Offshore platforms, Oil refineries, Coastal zone, Resources management.

Future uses of floating breakwaters were discussed at a workshop. Participants said that floating structures, which would dissipate wave energy, might someday be used to protect many harbor facilities, control coastal erosion and protect swimming areas. Among the other ideas were futuristic floating breakwaters which could protect areas for seaplane airports and breakwaters which could protect offshore nuclear power plants, oil refineries and deepwater ports. (See also W78-00840) (Sinha-OEIS)
W78-00856

WORKSHOP II: FLOATING BREAKWATERS FOR SMALL BOAT MARINAS.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-74-11637-17, Price codes: A02 in paper copy, A01 in microfiche. In: Rhode Island University Marine Technical Report Series No. 24, p 281-282, 1974. From the Floating Breakwaters Conference held Newport, Rhode Island, April 23-25, 1974.

Descriptors: *Breakwaters, *Marinas, *Construction materials, *Engineering structures, Coastal structures, Resources development, Water pollution sources, Environmental effects.
Identifiers: Floating breakwaters, Scrap tires, Coastal zone, Resources management.

An evening workshop brought together several marina owners and managers, local town officials and many of the regular conference participants for a discussion concerning the use of floating breakwaters for small boat marinas. Much of the workshop interest was focused on the potential use of scrap truck and auto tires as material for fabricating relatively inexpensive, effective floating breakwaters for small boat marinas. (See also W78-00840) (Sinha-OEIS)
W78-00857

8C. Hydraulic Machinery

MODEL STUDY OF THE INLET AND SUMP ON THE CLINTON FIRST AVENUE PUMP STATION,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
C. Farell.
IIHR Report No. 196, November 1976. 107 p, 42 fig, 11 ref.

Descriptors: *Hydraulic models, *Flow separation, *Pumping plants, *Baffles, *Hydraulic design, *Flow profiles, *Iowa, Hydraulics, Velocity, Channels, Model studies, Sumps, Froude number, Vortices.
Identifiers: *Clinton(Iowa).

A 1:7 scale model of the inlet and sump was constructed, comprising the new approach channel, the pump bays and forebay, the pump sumps and bells, and the approach conduit to the existing station. It was found that the 45-degree angle at which the flow is diverted from the approach channel into the two new pump sumps produces a large dead-water zone in the forebay and results in pronounced dips in the magnitude of the velocity in the pump bays and sumps, occurring toward the centerwall dividing the bay area. Captive eddies in the pump sumps due to this velocity nonuniformity were not detected, however, and neither were vortices originating at the free surface. On the other hand, thin vortices originating off the converging side walls of the sumps were observed. The vortices were rather stable in position and somewhat intermittent in time. The pressure fluctuations on the side walls associated with the vortices were found to be considerable, but pressure fluctuations elsewhere on the sumps boundaries were negligible. Baffle arrangements using a few baffles and avoiding narrow passages where trash accumulations could result in obstruction of the flow were developed to improve the uniformity of the approach flows to the sumps. The baffle arrangements did not eliminate completely the side wall vortices, whose strength, frequency of occurrence, and duration of persistence were found to be related to the conditions of the approach flow. (Adams-ISWS)
W78-00717

8D. Soil Mechanics

FINITE ELEMENT ANALYSES OF STRESSES AND MOVEMENTS IN BIRCH DAM,
California Univ., Berkeley. Office of Research Services.
A. Soriano, J. M. Duncan, K. Wong, and J. M. Simon.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 448, Price codes: A05 in paper copy, A01 in microfiche. Contract Report S-76-2, April 1976. 100 p, 50 fig, 8 tab, 10 ref, 1 append. DACW39-68-C-0078.

Descriptors: *Finite element analysis, *Earth dams, *Foundations, *Oklahoma, *Clays, Soil mechanics, Consolidation, Stress, Risks, On-site tests, Analytical techniques.
Identifiers: *Birch Dam(Okla), *Time-dependent consolidation, Heterogeneous deposits.

Finite element analyses were done to evaluate stresses and movements in the Birch Dam and its foundation for the pre- and post-construction conditions. The existence of compressible clays and silts in the foundation and the considerable time delay in the movements due to the consolidation of the foundation were considered. Because of the low strengths of clays in the foundation of the dam, it will be necessary to build the dam in 2 stages, allowing time for consolidation of the foundation before the second stage is built. The necessity for characterizing the stress-strain and strength characteristics of a heterogeneous deposit of natural soils and the necessity for determining time-dependent consolidation characteristics lead inevitably to undertainties in the accuracy of the results. When Birch Dam has been built and field measurements are available to compare with the analytical results presented, it will be possible to judge the effectiveness of th analyses. (Singh-ISWS)
W78-00701

OUTLET WORKS AND STILLING BASIN, HOWARD HANSON DAM, GREEN RIVER, WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS,
Army Engineer Div. North Pacific, Bonneville, OR. Hydraulics Lab.
P. M. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-000 324, Price codes: A06 in paper copy, A01 in microfiche. Technical Report No. 88-1, September 1966. 102 p, 4 fig, 20 tab, 13 photo, 28 plate, 1 append.

Descriptors: *Outlet works, *Hydraulic models, *Washington, Hydraulics, Hydraulic structures, Tunnels, Dams, Model studies, Basins, Design, Hydraulic design.
Identifiers: *Stilling basin, *Green River(Wash), *Howard Hanson Dam(Wash), Horseshoe tunnel, Emergency closure gate, Transition section splitter, J-rubber seals, Pressure chamber.

The outlet structure, horseshoe tunnel, and stilling basin proposed for Howard Hanson Dam were studied in a 1:25-scale hydraulic model. Flow conditions and pressures within the tunnel and stilling basin, discharge rating curves for the tainter-type regulating valves, and hydraulic downpull forces on the emergency closure gate were investigated. Design changes resulting from the tests were as follows: the transition section splitter was shortened 17.5 ft, the stilling basin was lowered from elev 987 to elev 981, and the two-step vertical end sill was replaced by an end sill sloped 1 on 1. Maximum downpull on the closure gate was 187 kips when flow was passed through one intake. It was 210 kips with flow through both intakes when air vents in the tainter valve housing were open, and 335 kips when the air vents were closed. Data for maximum allowable clearances for J-rubber seals on tainter valves operated under heads up to 200 ft of water were obtained in a 1:1-scale pressure chamber. Maximum head on the tainter valves at Howard Hanson Dam is about 171 ft. A 1/2-in. clearance between seal retainer bars on the valves and side seal plates in the conduit was allowable; there should be no clearance between the side seals and support plates at the intersection with the top seal. Values of friction drag for rectangular and music-note J-rubber seals against stainless, machine-finished, and chrome-plated steel surfaces were given in the appendix. (Lee-ISWS)
W78-00705

8F. Concrete

MATERIALS AND CONSTRUCTION TECHNIQUES FOR FLOATING BREAKWATERS,
Alaska Div. of Water and Harbors, Juneau.
For primary bibliographic entry see Field 8B.
W78-00854

8G. Materials

VIBRATING SCREENS IN INDUSTRIAL WASTE WATER TREATMENT,
Link Belt Co., Colmar, PA.
For primary bibliographic entry see Field 5D.
W78-00507

MATERIALS AND CONSTRUCTION TECHNIQUES FOR FLOATING BREAKWATERS,
Alaska Div. of Water and Harbors, Juneau.
For primary bibliographic entry see Field 8B.
W78-00854

8I. Fisheries Engineering

ABUNDANCE, GROWTH, DISTRIBUTION AND MOVEMENTS OF WHITE STURGEON IN THE MID-SNAKE RIVER,
Idaho Cooperative Fishery Research Unit, Moscow.
J. C. Coon, R. R. Ringe, and T. C. Bjornn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 604, Price codes: A04 in paper copy, A01 in microfiche. University of Idaho College of Forestry, Wildlife and Range Sciences, Completion Report, September 1977. 63 p, 9 fig, 19 tab, 24 ref. OWRT B-026-IDA(1), 14-31-0001-3877.

Descriptors: *Growth rates, Environmental effects, Population, Size, *Movement, *Fish reproduction, Habitats, Fish barriers, Food habits, Impoundments, Idaho, *Distribution, Dams, Post-impoundment, Fish management, Tagging.
Identifiers: *White Sturgeon, *Mid-Snake River(Idaho).

During the years 1972-75, 876 sturgeon were captured from the Snake River between Lower Granite and Hells Canyon dams. The sturgeon were marked or tagged so that their abundance, growth, distribution and movements could be assessed. 204 of the sturgeon were recaptured, some up to eight times. Some of the large pools in the Snake River contained more than 200 sturgeon, according to estimates. By expanding population estimates we made for several pools in the river, it is believed that 8,000-12,000 sturgeon resided in the study area during the period 1973-75. Small sturgeon (less than 3 ft.) were the most abundant (86%) of the fish caught. Sturgeon 3-6 ft. in length were least abundant (4%) and large fish (over 6 ft.) comprised 10% of the fish caught. There was some tendency for the 2-3 ft. sturgeon to move downstream, whereas the larger sturgeon did not move far from the original site of capture. Growth of sturgeon produced since dams were constructed in Hells Canyon was less than for sturgeon produced prior to damming of the river. Sturgeon are reproducing successfully in the middle section of the Snake River but the population may not thrive as in past years if the growth rate has indeed slowed and if critical habitat for the rearing of 3-6 ft. sturgeon has been eliminated by dams in the lower Snake River.
W78-00552

SUGGESTED CRITERIA FOR IRRIGATION WATER INTAKES IN MISSOURI RIVER RESERVOIRS, SOUTH DAKOTA,
South Dakota State Univ. Brookings, Dept. of Civil Engineering.
D. J. Voogt.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 090, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 1977. 23 p, 3 fig, 6 ref. OWRT A-060-SDAK(1), 14-34-0001-7087.

Descriptors: Irrigation, Water delivery, *Intakes, Reservoir fisheries, Fish passages, Fish behavior, *Fish conservation, *South Dakota, Reservoirs, *Missouri River, *Irrigation water, Pumping.
Identifiers: *Blue Blanket reservoir(So Dak).

Shallow embayments and backwater areas associated with the Missouri River reservoirs form the primary spawning and nursery grounds of fish. The biological impact on these areas of irrigation water intakes was investigated . The study was confined to one type of inlet conveying about 3 cfs placed in the productive spawning embayment near North-South Dakota border called Blue Blanket. Pumping took place during July and August. The pumping had no measurable impact on fish life. No egg, larva or fish life of any kind was detected in the irrigation water samples. Counts of zooplankton numbers in the irrigation water were considerably lower than in the reservoirs, indicating possible avoidance. The flow pattern into the inlets indicates that the zone of influence of the intake is relatively small. (Wiersma-South Dakota State)
W78-00706

AERATION OF HYDRO RELEASES AT FT. PATRICK HENRY DAM,
Tennessee Valley Authority, Chattanooga. Water Quality and Ecology Branch.
For primary bibliographic entry see Field 5G.
W78-00711

IMPINGEMENT OF FISHES AT PEACH BOTTOM ATOMIC POWER STATION, PENNSYLVANIA,
Ichthyological Associates, Inc., Drumore, PA.
D. Mathur, P. G. Heisey, and N. C. Magnusson.
Transactions of the American Fisheries Society, Vol 106, No 3, p 258-267, 1977. 2 fig, 6 tab, 15 ref.

Descriptors: *Nuclear powerplants, *Cooling water, *Fishkills, *Water cooling, *Fish behavior, *Mortality, *Fish populations, *Intakes, *Intake structures, *Water temperature, *Regression analysis, Channel catfish, Sunfishes, Pennsylvania.
Identifiers: *Impingement, Peach Bottom Atomic Power Station, Fish screens, Vertical traveling screens, White crappie, Bluegill, Sunfish.

The rate of impingement of fishes on the vertical traveling screens at Peach Bottom Atomic Power Station, Pennsylvania, was determined from November, 1973 through December 1975. Channel catfish, white crappie, and bluegill were impinged most frequently. Impingement was highest in November through April. Impingement was highest during the start-up phase of each unit. Multiple regression analysis revealed that the intake water temperatures, daily river flow, and pond elevation accounted for 32 to 73% of the variation in the impingement of fishes. Winter (January through March) mortality of white crappie and bluegill at the screens was equal to that caused by a few anglers over the same period. The design and placement of the screens, preceded by relevant behavioral studies were, in part, responsible for minimal fish losses due to impingement at Peach Bottom. (Katz)
W78-00875

USE OF THE LESLIE MATRIX FOR ASSESSING ENVIRONMENTAL IMPACT WITH AN EXAMPLE FOR A FISH POPULATION,
Stone and Webster Engineering Corp., Boston, MA. Environmental Div.
T. J. Horst.
Transactions of the American Fisheries Society, Vol 106, No 3, p 253-257, 1977. 4 fig, 1 tab, 9 ref.

Descriptors: Mathematical studies, *Mathematical models, Fish populations, *Growth rates, *Entrainment, *Fish eggs, *Larvae, Statistical methods, *Statistical models, *Estimating equations, Analytical techniques, Population, Environmental effects.
Identifiers: *Leslie matrix, Cunner.

The Leslie matrix model for discrete population theory was examined for the assessment of the effects of environmental alterations on a species population using an eigenvalue analysis. This analysis provided estimates of population growth rate and stable age distribution. A sensitivity analysis was conducted for changes in elements of the population matrix and the resultant effect on population growth and stable age distribution. An example of the technique was presented for the cunner (Tautogolabrus adspersus). This example considered the effect of entrainment of cunner eggs and larvae at intakes of power stations. (Katz)
W78-00876

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

COASTAL ZONE LEGAL REFERENCES, 1976.
State Univ. of New York at Buffalo, Amherst. Sea Grant Law Center.
For primary bibliographic entry see Field 06E.
W78-00657

10D. Specialized Information Center Services

PENNSYLVANIA WATER RESOURCES RESEARCH CENTER TECHNOLOGY TRANSFER PROGRAMS - A CASE STUDY,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 04B.
W78-00565

10F. Preparation Of Reviews

ENERGY FROM THE WEST: A PROGRESS REPORT OF A TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT. VOLUME I-SUMMARY REPORT,
Oklahoma Univ., Norman. Science and Public Policy Program; and Radian Corp., Austin, TX.
For primary bibliographic entry see Field 06G.
W78-00753

SUBJECT INDEX

ABIOTIC ENVIRONMENT
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

ABSORBTION
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

ABSORPTION
Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

ACID MINE WATER
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

ACOUSTICS
Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

ADMINISTRATION
The Role of State Legislation in Ground Water Management,
W78-00658 4B

ADMINISTRATIVE AGENCIES
Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

ADMINISTRATIVE DECISIONS
Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

ADMINISTRATIVE REGULATIONS
Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

AERATION
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

AERIAL PHOTOGRAPHY
Determination of the Leeway of Oil Slicks,
W78-00609 5A

AERIAL ROOTS (PLANTS)
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

AFRICA
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

AGRICULTURAL CHEMICALS
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

AGRICULTURAL DRAINAGE
Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

AGRICULTURAL RUNOFF
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

AGRICULTURAL USE
An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

AGRICULTURAL WATERSHEDS
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

AGRICULTURE
Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

AIR POLLUTION
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

1975 Annual Report.
W78-00721 5A

Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

Atmospheric Dispersion Models for Environmental Pollution Applications,
W78-00729 5A

Urban Diffusion Problems,
W78-00730 5A

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Standard Deviation of Wind Direction as a Function of Time; Three Hours to Five Hundred Seventy-Six Hours,
W78-00733 2B

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

Plume Rise Predictions,
W78-00736 5A

Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

Estimation of Downwash Effects,
W78-00741 5A

AIR POLLUTION EFFECTS
Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

AIR POLLUTION SOURCES
A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

ALASKA
Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

ALBEDO
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

ALDRIN
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

ALGAE
Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Narachansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

ALGAL TOXINS
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

ALGORITHMS
Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

ALIPHATIC COMPOUNDS
The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

ALKANES
Arctic Hydrocarbon Biodegradation,
W78-00600 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

ALLUVIAL AQUIFERS
Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

ALLUVIAL CHANNELS
Alluvial Channel Bedforms,
W78-00826 2J

ALLUVIUM
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

ALTERNATIVE PLANNING
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

Feasibility of Interbasin Water Transfer,
W78-00628 4A

AMIBEN
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

AMMONIA
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

AMMONIA COMPOUNDS
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

ANAEROBIC DIGESTION
Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

ANALYTIC SOLUTIONS
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

ANALYTICAL TECHNIQUES
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

ANCHORAGE AREA (ALASKA)
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

ANIMAL BEHAVIOR
Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

ANIMAL DISEASES
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

ANIMAL GROWTH
Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

ANIMAL METABOLISM
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

ANIMAL PHYSIOLOGY
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

ANNELIDS
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

ANTARCTIC
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

APACHE COUNTY
Maps Showing Ground-Water Conditions in the Nortnern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

APPROPRIATION
Nettleton v. Higginson (Constitutionality of Water Distribution Priorities in Times of Scarcity).
W78-00673 6E

AQUATIC ALGAE
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

AQUATIC ANIMALS
Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

AQUATIC BACTERIA
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

AQUATIC INSECTS
General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

AQUATIC MICROORGANISMS
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

AQUATIC PLANTS
Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

AQUATIC WEEDS
Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

AQUEOUS SOLUTIONS
Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

AQUIFER CHARACTERISTICS
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

AQUIFER MANAGEMENT
Congress Receives Comprehensive Ground Water Report.
W78-00662 4B

Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

AQUIFER SYSTEMS
Congress Receives Comprehensive Ground Water Report.
W78-00662 4B

AQUIFER TESTING
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

AQUIFERS
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

Some Water Resource System Studies in the UK,
W78-00636 4B

A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

Congress Receives Comprehensive Ground Water Report.
W78-00662 4B

Water and Land Development--Wells.
W78-00672 6E

Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

ARCTIC
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

ARENES
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

ARIZONA
State Legislative Response to the Central Arizona Project,
W78-00707 6E

Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

ARKANSAS RIVER BASIN
Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

ARMORING PROCESS (SEDIMENTS)
Armoring Process in Degrading Streams,
W78-00527 2J

AROMATIC COMPOUNDS
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

ARTESIAN AQUIFERS
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

ARTIFICIAL ISLANDS
Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

ARTIFICIAL RECHARGE
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

ARYL HYDROCARBON HYDROXYLASE
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

ASSESSMENTS
Environmental Assessment Perspectives,
W78-00773 5G

ATCHAFALAYA RIVER (LA)
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

ATLANTIC COASTAL PLAIN
Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

ATLANTIC INNER SHELF
Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

ATLANTIC SALMON
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

ATTITUDES
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

AUSTRALIA
Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

AUTO-REGRESSIVE MODELS
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

BACKWATER
Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

BAFFLES
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

BALTIC SEA
Ecological-Faunistic Investigations on the Meiobenthos of the Saaler Bodden, GDR, Baltic Sea, (In German),
W78-00501 2L

BARRIERS
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

BASELINE STUDIES
Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

BAYESIAN METHODS
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

BAYESIAN TECHNIQUES
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

BAYS
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

BEACH EROSION
Problems of Coastal Management,
W78-00801 6E

BEACHES
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

State V. Mizrahi (Authority of Municipality to Charge Public for Use of Beach).
W78-00795 6E

Problems of Coastal Management,
W78-00801 6E

BEANS
Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

BEAVER CREEK (TN)
Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

BED LOAD
Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

BED MATERIAL
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

BEHAVIOR
Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

BEL AIR QUADRANGLE
Bel Air Quadrangle Hydrogeology,
W78-00806 7C

BELGIUM
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

BENEFIT MAXIMIZATION
An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

BENEFITS
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

BENTHIC FAUNA
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

BENTHIC FLORA
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

BENTHOS
Ecological-Faunistic Investigations on the Meiobenthos of the Saaler Bodden, GDR, Baltic Sea, (In German),
W78-00501 2L

Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

BENZENE
Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

BENZO (A)PYRENE
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

BIBLIOGRAPHIES
Coastal Zone Legal References, 1976.
W78-00657 6E

BIOACCUMULATION
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

BIOASSAY
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

BIOCHEMICAL OXYGEN DEMAND
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

BIODEGRADATION
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

BIOGENIC HYDROCARBONS
Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

BIOINDICATORS
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

BIOLOGICAL COMMUNITIES
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

BIOLOGICAL MEMBRANES
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

BIOLOGICAL MEMBRANES

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

BIOLOGICAL TREATMENT

Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

BIOTA

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

BIRCH DAM (OKLA)

Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

BIRD EGGS

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

BLACK EARTH CREEK (WI)

Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

BLOWOUTS

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

BLUE BLANKET RESERVOIR (SO DAK)

Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

BLUEFISH

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

BOATS

Captain Soma Boat Line V. City of Wisconsin Dells (Reasonable Obstructions to Navigable Streams).
W78-00668 6E

BODIES OF WATER

Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

BOTTOM SEDIMENTS

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

Alluvial Channel Bedforms,
W78-00826 2J

BOTTOMS SEDIMENTS

Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

BOULDER CANYON PROJECT ACT

Interstate Waters - Boulder Canyon Project.
W78-00794 6E

BOUNDARIES (PROPERTY)

Deeds: Description of Land Conveyed by Reference to River or Stream as Carrying to Thread or Center or Only to Bank Thereof - Modern Status,
W78-00798 6E

BOUNDARY DISPUTES

Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

Deeds: Description of Land Conveyed by Reference to River or Stream as Carrying to Thread or Center or Only to Bank Thereof - Modern Status,
W78-00798 6E

BOUNDARY LAYERS

Atmospheric Reaeration in a Lake,
W78-00561 5G

BOUNDARY-VALUE PROBLEMS

Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

BRAZIL (BAIXADA FLUMINENSE)

The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

BREAKWATERS

Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

The Harris Floating Breakwater,
W78-00852 8B

Scrap Tire Floating Breakwaters,
W78-00853 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

Workshop I: Future Uses of Floating Breakwaters.
W78-00856 8B

Workshop II: Floating Breakwaters for Small Boat Marinas.
W78-00857 8B

BRIDGE DESIGN

Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

BRIDGE OPENING

Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

BRIDGES

Captain Soma Boat Line V. City of Wisconsin Dells (Reasonable Obstructions to Navigable Streams).
W78-00668 6E

BRINES

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

BROAD RIVER (SC)

Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

BROMINE

Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

BUFFERSTRIPS (STREAMS)

Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

BUNKER C OIL

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

BUTANE

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

C2-C10 HYDROCARBONS

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

CADMIUM

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

CALCIUM

Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

CALCIUM CARBONATE
Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

CALIBRATIONS
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

CALIFORNIA
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

Water Conditions in California, Basic Data Supplement.
W78-00545 2B

Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

Water Conditions and Flood Events in California, Water Year 1975-76.
W78-00718 2E

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

CANADA
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

CANAL CONSTRUCTION
Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

CANCER
Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

CANEY FORK RIVER (TN)
Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

CARBON
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

CARBON CYCLE
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

CARBON DIOXIDE
Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

CARBONATE ROCKS
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

CARCINOGENS
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

CATACHOLAMINES
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

CATCHMENT MODELS
Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

CELLULOSE
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

CENTRAL ARIZONA PROJECT
State Legislative Response to the Central Arizona Project,
W78-00707 6E

CERAMIC
A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

CHANCE-CONSTRAINED PROGRAMMING
Chance Constrained Model of Water Resources Systems,
W78-00641 4A

CHANNEL CATFISH
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

CHANNEL MORPHOLOGY
Alluvial Channel Bedforms,
W78-00826 2J

CHARGED PARTICLES
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

CHEMICAL ANALYSIS
Rendering Plant Waste Treatment Studies,
W78-00513 5A

On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

CHEMICAL COAGULATION
Rendering Plant Waste Treatment Studies,
W78-00513 5A

CHEMICAL DEGRADATIONS
Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

CHEMICAL DISPERSANTS
Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

CHEMICAL PRECIPITATION
Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

CHEMICAL REACTIONS
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

CHEMICAL RELAXATION KINETICS
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

CHINOOK SALMON
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

CHISELLING
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

CHLORINATED HYDROCARBON PESTICIDES
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

CHLORINATED HYDROCARBON PESTICIDES

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

CHLORINATED NAPHTHALENES
Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

CHLORINATION
Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

CHLORINE
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

CHLORINE AVOIDANCE
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

CHLOROBROMINATED EFFLUENT
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

CHROMATOGRAPHY
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

CHROMIUM
Tannery Waste Management,
W78-00512 5D

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

CHRONIC EXPOSURE
CEPEX Hardware: (Now and in the Future),
W78-00837 5C

CITIES
Urban Diffusion Problems,
W78-00730 5A

Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

CLAMS
Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

CLASSIFICATION
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

CLAYS
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

CLINTON (IOWA)
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

CLOUD SEEDING
Uniformity Among Weather Modification Laws,
W78-00745 2B

CLUSTERING
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

COAGULATION
Rendering Plant Waste Treatment Studies,
W78-00513 5A

COAL
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

COAL-ENERGY DEVELOPMENT
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

COAL MINES
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

COAL SLURRY PIPELINES
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

COASTAL AQUIFERS
A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

COASTAL MARSHES
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

COASTAL STRUCTURES
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

The Harris Floating Breakwater,
W78-00852 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

COASTAL WATERS
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

COASTAL ZONE MANAGEMENT
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

Coastal Zone Legal References, 1976.
W78-00657 6E

COASTAL ZONE MANAGEMENT ACT OF 1972
Omnibus Water Resources Development Act of 1976.
W78-00650 6E

Coastal Zone Management Program Development Grants.
W78-00777 2L

COASTAL ZONES
Coastal Zone Legal References, 1976.
W78-00657 6E

COASTS
Coastal Zone Legal References, 1976.
W78-00657 6E

Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

Coastal Zone Management Program Development Grants.
W78-00777 2L

COD
Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

COHO SALMON
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

COLLOIDS
Hydrocarbons in the Water Column,
W78-00574 5B

The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

COLORADO
Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

COLORADO RIVER
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

COLORADO RIVER BASIN
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

COLORADO RIVER COMPACT
Interstate Waters - Boulder Canyon Project.
W78-00794 6E

COLORIMETRIC METHOD
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

COMMERCIAL FISHING
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

COMMERCIAL SHELLFISH
The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

COMMON EIDER DUCK
Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

COMMUNITY DEVELOPMENT
Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

COMPETITION
Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

COMPREHENSIVE PLANNING
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

COMPUTATIONAL HYDRAULICS
Computational Hydraulics: An Alternative View,
W78-00524 5B

COMPUTER MODELS
Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

COMPUTER PROGRAMS
Subroutine for Settling Velocities of Spheres,
W78-00528 2J

A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

CONCOMITANCE
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

CONFERENCES
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Oceans '77 Conference Record.
W78-00827 5G

1974 Floating Breakwaters Conference Papers.
W78-00840 8B

CONGAREE RIVER (SC)
Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

CONGEWAI CREEK (NEW SOUTH WALES)
Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

CONGRESSIONAL HEARINGS
Omnibus Water Resources Development Act of 1976.
W78-00650 6E

CONJUCTIVE USE
Some Water Resource System Studies in the UK,
W78-00636 4B

CONNECTICUT
Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

CONNECTICUT RIVER BASIN
New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

CONNEMARA (IRELAND)
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

CONSTRUCTION MATERIALS
Scrap Tire Floating Breakwaters,
W78-00853 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Workshop II: Floating Breakwaters for Small Boat Marinas.
W78-00857 8B

CONTINENTAL SHELF
Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

CONTINENTAL SHELF

Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

CONTROL

Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

CONVECTION

Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

COOLING TOWERS

Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

Predicted and Observed Cooling Tower Plume Rise and Visible Plume Length at the John E. Amos Power Plant,
W78-00739 5A

COOLING WATER

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

COORDINATION

Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

Success Stories in Multiple Use,
W78-00660 6B

COPEPODS

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

COPPER

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

CORAL

Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

CORN (FIELD)

Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

CORPS OF ENGINEERS

Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

CORRELATION ANALYSIS

Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

CORTICOSTEROIDS

Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

COST ALLOCATION

A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

COST ANALYSIS

Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

COST-BENEFIT ANALYSIS

U.S. Industry and States Urge a Rethink of Water Quality Law.
W78-00785 5G

COST COMPARISONS

The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

Feasibility of Interbasin Water Transfer,
W78-00628 4A

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

COST MINIMIZATION

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

COST OF A CLEAN ENVIRONMENT (CCE)

Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

COST SAVINGS

The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

COST SHARING

A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

COSTS

Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

COTTONWOOD CREEK (CO)

Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

CRABS

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

CRASPEDACUSTA-SOWERBYI

The Medusa Craspedacusta Sowerbyi Lankester (Limnomedusae) in Lake Sirio (IVrea, Torino), (In Italian),
W78-00846 2H

CROPS

Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

CRUDE OIL

Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

Hydrocarbons in the Water Column,
W78-00574 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Determination of the Leeway of Oil Slicks,
W78-00609 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

CRUSTACEANS

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

CRYSTALLINE ROCKS

Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

CULTIVATION

Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

CUMBERLAND RIVER (TN)

Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

CURRENTS (WATER)

Determination of the Leeway of Oil Slicks,
W78-00609 5A

CYTOLOGICAL STUDIES

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

DAM CONSTRUCTION

Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

DAM DESIGN

Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

DAM EFFECTS

Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

DAM FAILURE

Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

DAMAGES

The Role of Insurance in Environmental Litigation,
W78-00789 6F

DAMS

Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

DARCYS LAW

Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

DATA ACQUISITION

Environmental Assessment Perspectives,
W78-00773 5G

DATA COLLECTIONS

Water Conditions in California, Basic Data Supplement.
W78-00545 2B

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

DATA GENERATION

Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

DATA PROCESSING

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

DATA STORAGE AND RETRIEVAL

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

DDE

Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

DDT

Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

DECISION MAKING

Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

DECLARATORY JUDGMENT

Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

DEEP WATER PORTS
Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

DEGRADATION (STREAM)
Armoring Process in Degrading Streams,
W78-00527 2J

DEHYDRATION
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

DELAWARE
Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

DENITRIFICATION
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

DENMARK
The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

DENSITY CURRENTS
Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

DEPURATION
Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

DESIGN
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

DESIGN CRITERIA
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

DEVILS LAKE BASIN (N DAK)
Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

DIAGENESIS
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

DIATOMS
The Distribution of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Narachansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

DIELDRIN
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

DIFFUSION
Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

1975 Annual Report.
W78-00721 5A

Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

DIFFUSION-TYPING SCHEMES
Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

DIHYDRODIOLS
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

DINOFLAGELLATES
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

DISASTER PLANNING
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

DISPERSION
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

Hydrocarbons in the Water Column,
W78-00574 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

1975 Annual Report.
W78-00721 5A

Atmospheric Dispersion Models for Environmental Pollution Applications,
W78-00729 5A

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Standard Deviation of Wind Direction as a Function of Time; Three Hours to Five Hundred Seventy-Six Hours,
W78-00733 2B

Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves, (In Russian),
W78-00744 2I

A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

DISSOLVED GASES
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

DISSOLVED OXYGEN
Atmospheric Reaeration in a Lake,
W78-00561 5G

Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

DISSOLVED SOLIDS
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

DISTRIBUTION
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

The Distribution of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

DISTRIBUTION PATTERNS
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

DITCHES
Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

DIVERSION
Permits for Diversion, Transfer, Appropriation of Water from Interstate Streams; Stored Water; Waste Water.
W78-00665 6E

DIVERSION STRUCTURES
Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

DNIEPER RIVER
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

DOUBLET WELLS
Review of C.E. Jacob's Doublet Well,
W78-00720 8B

DOWNWASH EFFECTS
Estimation of Downwash Effects,
W78-00741 5A

DRAINAGE
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

Land Drainage in England and Wales,
W78-00691 4A

Probabilistic Substantiation of Land Improvement Regulation, (In Russian),
W78-00851 4A

DRAWDOWN
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

DREDGING
Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

DRILLING
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

DRILLING FLUIDS
Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

DROUGHT
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

DROUGHTS
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

The Drought,
W78-00807 2B

DUAL MEDIA FILTRATION
Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

DUCHESNE RIVER BASIN (UTAH)
Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

DUCKS (WILD)
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

DYNAMIC PROGRAMMING
General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

EAGLE RIVER VALLEY
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

EARTH DAMS
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

EARTHQUAKES
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

EAST RIVER (WI)
Flood Plain Information: East River and Tributaries, City of Green Bay and Brown County, Wisconsin.
W78-00761 4A

ECOLOGICAL DISTRIBUTION
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

ECOLOGICAL IMPACTS
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

ECOLOGY
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

ECONOMIC BENEFITS
Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

ECONOMIC EFFICIENCY
A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

ECONOMIC IMPACT
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

U.S. Industry and States Urge a Rethink of Water Quality Law.
W78-00785 5G

ECOSYSTEMS
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

CEPEX Hardware: (Now and in the Future),
W78-00837 5C

EFFLUENTS
Predicted and Observed Cooling Tower Plume Rise and Visible Plume Length at the John E. Amos Power Plant,
W78-00739 5A

Estimation of Downwash Effects,
W78-00741 5A

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

ELECTRIC POWER
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

ELECTRICAL PROPERTIES
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

ELECTROCHEMISTRY
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

ELECTRON MICROSCOPY
The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

EMBRYOGENESIS
The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

EMBRYONIC GROWTH STAGE
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

EMBRYONIC GROWTH STAGES
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

EMULSIONS
Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

ENDOCRINE SYSTEM
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

ENERGY
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Environmental Assessment Perspectives,
W78-00773 5G

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

ENERGY POLICY
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

ENERGY SYSTEM DEVELOPMENT
Environmental Assessment Perspectives,
W78-00773 5G

ENGINEERING
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

ENGINEERING STRUCTURES
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

The Harris Floating Breakwater,
W78-00852 8B

Scrap Tire Floating Breakwaters,
W78-00853 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

Workshop II: Floating Breakwaters for Small Boat Marinas.
W78-00857 8B

ENGLAND
Land Drainage in England and Wales,
W78-00691 4A

Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

ENTRAINMENT
Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

ENVIRONMENTAL ASSESSMENT
Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

Environmental Assessment Perspectives,
W78-00773 5G

ENVIRONMENTAL CONTROL
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

ENVIRONMENTAL EFFECTS
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

Environmental Assessment Perspectives,
W78-00773 5G

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

The Drought,
W78-00807 2B

Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

Effects of Produced Waters on the Marine Environment,
W78-00834 5C

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

CEPEX Hardware: (Now and in the Future),
W78-00837 5C

Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

Hawaii and the Manganese Nodule Industry,
W78-00839 6G

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

ENVIRONMENTAL IMPACT STATEMENT

Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

ENVIRONMENTAL IMPACT STATEMENTS

An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

ENVIRONMENTAL POLICY

Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

ENVIRONMENTAL PROTECTION AGENCY

Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

ENVIRONMENTAL QUALITY

Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

ENVIRONMENTAL VALUES

Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

ENZYMES

Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

EQUATIONS

Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

EQUIPMENT

A Registration Unit for Drain Outflow, Groundwater Depth and Precipitation,
W78-00682 7B

ESTIMATING EQUATIONS

Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

ESTUARIES

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

ESTUARINE ENVIRONMENT

The Fate of Petrolcum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

ETHANE

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

EVALUATION

Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

EVAPORATION

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

EXPLOITATION

International Ocean Institute,
W78-00780 6E

EXPLORATION

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

EXTRA HIGH VOLTAGE TRANSMISSION

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

EXTREME VALUE DISTRIBUTION

A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

EYEBROOK RESERVOIR SIPHON SPILLWAY

Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

FALLOUT
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

FARMOOR RESERVOIR (ENGLAND)
The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

FATHEAD MINNOW
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

FEASIBILITY STUDIES
Feasibility of Interbasin Water Transfer,
W78-00628 4A

FECUNDITY
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

FEDERAL JURISDICTION
Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

FEDERAL POWER ACT
Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

FEDERAL PROJECT POLICY
A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

FEDERAL WATER POLLUTION CONTROL ACT
U.S. Industry and States Urge a Rethink of Water Quality Law.
W78-00785 5G

Clean Water Progress - Yes, Speed - No,
W78-00791 5G

Republic Steel Corporation V. Train (Environmental Protection Agency Permit Objection Improper Where no Guidelines Available).
W78-00792 6E

United States V. Hamel (Gasoline as a Pollutant Under the Federal Water Pollution Control Act).
W78-00797 6E

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972
Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

FERMENTATION
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

FERTILITY
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

FERTILIZATION
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

FERTILIZERS
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

FILTERS
Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

FILTRATION
Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

FINITE ELEMENT ANALYSIS
Computational Hydraulics: An Alternative View,
W78-00524 5B

Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

FISH
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

FISH BEHAVIOR
Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

FISH CONSERVATION
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

FISH EGGS
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

FISH FOOD ORGANISMS
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

FISH GENETICS
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

FISH PHYSIOLOGY
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

FISH POPULATIONS
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

FISH REPRODUCTION
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

FISHERIES
Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

FISHKILLS
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

FJORDS
The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

FLAX POND (NY)
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

FLOATING BREAKWATERS
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

The Harris Floating Breakwater,
W78-00852 8B

Scrap Tire Floating Breakwaters,
W78-00853 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

Workshop I: Future Uses of Floating Breakwaters.
W78-00856 8B

FLOCCULATION
Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

FLOOD CONTROL
Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

Omnibus Water Resources Development Act of 1976.
W78-00650 6E

FLOOD DATA
Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

Flood Plain Information: East River and Tributaries, City of Green Bay and Brown County, Wisconsin.
W78-00761 4A

Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

FLOOD FLOW
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

FLOOD FORECASTING
Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributarie s, Vicinity of Brownsville, Tennessee.
W78-00765 4A

Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

FLOOD FREQUENCY
A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

FLOOD PLAIN INSURANCE
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

FLOOD PLAIN MANAGEMENT
New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

FLOOD PLAIN ZONING
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

FLOOD PLAINS
An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

FLOOD PROTECTION
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

Feasibility of Interbasin Water Transfer,
W78-00628 4A

Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

FLOOD RISK
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

FLOOD ROUTING
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

FLOOD STAGES
Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

FLOODS
Water Conditions and Flood Events in California, Water Year 1975-76.
W78-00718 2E

Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

FLORIDA
Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

Problems of Coastal Management,
W78-00801 6E

Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

FLOW
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

FLOW PROFILES
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

FLOW SEPARATION
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

FLUORESCENCE
A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

FOOD CHAINS
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

FOOD PROCESSING INDUSTRY
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

Rendering Plant Waste Treatment Studies,
W78-00513 5A

FOOD WEB TRANSFER
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

FOOD WEBS
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

FORECASTING
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

FOREIGN COUNTRIES
Oceanography and the Law of the Sea,
W78-00787 6E

FOREST MANAGEMENT
Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

FOREST SOILS
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

FORESTRY
Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

FORESTS
Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

Photographic Assessment of Deciduous Forest Radiation Regimes,
W78-00725 2B

Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

FOUNDATIONS
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

FRACTURE TRACE WATER WELL LOCATION
Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

FRESHWATER INFLOW
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

FRY
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

FT. PATRICK HENRY DAM (TENN)
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

FUCUS
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

FURBEARERS
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

FUTURE PLANNING (PROJECTED)
Clean Water Progress - Yes, Speed - No,
W78-00791 5G

GAGES
A Registration Unit for Drain Outflow, Groundwater Depth and Precipitation,
W78-00682 7B

GAGING STATIONS
A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

GAS CHROMATOGRAPHY
The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

GASES
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

GASOLINE
United States V. Hamel (Gasoline as a Pollutant Under the Federal Water Pollution Control Act).
W78-00797 6E

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

GAUSSIAN DISPERSION MODEL
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

GENETICS
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

GEOCHEMISTRY
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

GEOLOGICAL SURVEYS
Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

GEOMORPHOLOGY
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

GEORGIA PIEDMONT
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

GEOTHERMAL STUDIES
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

GLACIOLOGY
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

GRAIN SORGHUM
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

GRANTS
Coastal Zone Management Program Development Grants.
W78-00777 2L

GRAVIMETRIC CALIBRATION TECHNIQUE
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

GREAT BASIN
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

GREAT LAKES
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

GREEN RIVER (WASH)
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

GREENLAND
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

GROUNDWATER
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

Some Water Resource System Studies in the UK,
W78-00636 4B

The Role of State Legislation in Ground Water Management,
W78-00658 4B

Congress Receives Comprehensive Ground Water Report.
W78-00662 4B

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

GROUNDWATER AVAILABILITY
Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

GROUNDWATER BASINS
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

GROUNDWATER MANAGEMENT
The Role of State Legislation in Ground Water Management,
W78-00658 4B

Congress Receives Comprehensive Ground Water Report.
W78-00662 4B

Reservoirs.
W78-00667 6E

GROUNDWATER MOVEMENT
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

GROUNDWATER RECHARGE
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

GROUNDWATER RESOURCES
Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

GROVE CREEK (TN)
North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

GROWTH RATES
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

GROWTH RATES

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

GROWTH STAGES
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

GULF OF MEXICO
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

GUTHION
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

HABITATS
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

HALIDES
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

HARBORS
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

The Harris Floating Breakwater,
W78-00852 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

Workshop I: Future Uses of Floating Breakwaters.
W78-00856 8B

HARYANA (INDIA)
A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

HATCHING
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

HAWAII
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

Water and Land Development--Wells.
W78-00672 6E

Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

HAZARDS
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

HEAT BALANCE
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

HEAT DISPERSION
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

HEAT TRANSFER
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

HEAVY METALS
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

HELIUM
Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

HEMATOLOGY
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

HEPATIC MICROSOMES
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

HERBICIDES
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

HEURISTIC METHODS
Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

HIERARCHICAL ANALYSIS
Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

HIGHWAY DESIGN
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

HIGHWAY DRAINAGE
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

HIGHWAYS
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

HISTORY
A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

HONG KONG
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

HOOSIER CREEK (TN)
North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

HORSESHOE CRAB
Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

HOWARD HANSON DAM (WASH)
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

HSIANG-REILLY METHOD
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

HUDSON RIVER
Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

HUNGARY (LAKE FERTO)
Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

HUNTING
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

HYDRATURE (PLANTS)
The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

HYDRAULIC CONDUCTIVITY
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

HYDRAULIC DESIGN
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

HYDRAULIC EQUIPMENT
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

HYDRAULIC MODELS
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

HYDRAULIC PROPERTIES
Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

HYDRAULIC STRUCTURES
Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

HYDRAULICS
Computational Hydraulics: An Alternative View,
W78-00524 5B

HYDRODYNAMICS
Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

HYDROELECTRIC PLANTS
Omnibus Water Resources Development Act of 1976.
W78-00650 6E

Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

HYDROELECTRIC PROJECT LICENSING
Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

HYDROGEOLOGY
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

HYDROGRAPH ANALYSIS
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

HYDROLOGIC DATA
Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

HYDROLOGIC SYSTEMS
Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

HYDROLOGY
Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

HYSTERESIS
Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

IDAHO
Nettleton v. Higginson (Constitutionality of Water Distribution Priorities in Times of Scarcity).
W78-00673 6E

IMPACT (RAINFALL)
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

IMPINGEMENT
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

IMPOUNDMENTS
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

INCUBATION
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

INDICATORS
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

INDIRECT FLOOD MEASUREMENT
Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

INDUSTRIAL WASTES
Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

INDUSTRIES
U.S. Industry and States Urge a Rethink of Water Quality Law.
W78-00785 5G

INFILTRATION
Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

INJECTION WELLS
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Waste-

INJECTION WELLS
water Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

INLAND WATER ROUTE REGION (MICH)
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

INORGANIC COMPOUNDS
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

INSECTICIDES
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

INSTITUTIONS
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

INSTRUMENTATION
A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

A Registration Unit for Drain Outflow, Groundwater Depth and Precipitation,
W78-00682 7B

INSURANCE
The Role of Insurance in Environmental Litigation,
W78-00789 6F

INTAKE STRUCTURES
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

INTAKES
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

INTER-BASIN TRANSFER
Feasibility of Interbasin Water Transfer,
W78-00628 4A

INTERCEPTOR SEWERS
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

INTERNATIONAL AGREEMENTS
Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

INTERNATIONAL COMMISSION
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

INTERNATIONAL COMMISSIONS
President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

INTERNATIONAL LAW
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

International Ocean Institute,
W78-00780 6E

The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

INTERNATIONAL WATERS
Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

International Ocean Institute,
W78-00780 6E

The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

Oceanography and the Law of the Sea,
W78-00787 6E

INTERSTATE RIVERS
Permits for Diversion, Transfer, Appropriation of Water from Interstate Streams; Stored Water; Waste Water.
W78-00665 6E

INTERTIDAL AREAS
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

INVERTEBRATES
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

IONIC CONCENTRATIONS
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

IONS
Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

IOWA
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

IRISH SEA
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

IRON
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

IRRIGATION
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

IRRIGATION EFFECTS
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

IRRIGATION EFFICIENCY
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

IRRIGATION TIMING
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

IRRIGATION WATER
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

ISLANDS
Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

ISOPODS
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

JARRETTSVILLE QUADRANGLE
Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

JUDICIAL DECISIONS
Coastal Zone Legal References, 1976.
W78-00657 6E

JUVENILE GROWTH STAGE
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

KILLIFISHES
Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

KINETICS
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

KING CRAB
Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

LABORATORY TESTS
Armoring Process in Degrading Streams,
W78-00527 2J

Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

LAGOONS
Tannery Waste Management,
W78-00512 5D

LAJAS VALLEY (PR)
Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

LAKE ERIE
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

LAKE HYDROLOGY
Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

LAKE KEBAN (TURKEY)
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

LAKE ONTARIO
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

LAKE SHORES
Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

LAKE SIRIO (ITALY)
The Medusa Craspedacusta Sowerbyi Lankester (Limnomedusae) in Lake Sirio (IVrea, Torino), (In Italian),
W78-00846 2H

LAKE TROUT
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

LAKES
The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

LAND RECLAMATION
Probabilistic Substantiation of Land Improvement Regulation, (In Russian),
W78-00851 4A

LAND RESOURCES
Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

LAND TENURE
Deeds: Description of Land Conveyed by Reference to River or Stream as Carrying to Thread or Center or Only to Bank Thereof - Modern Status,
W78-00798 6E

LAND USE
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

LANDFILLS
Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

LARVAE
Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

LARVAL GROWTH
Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

LARVAL GROWTH STAGE
Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip

Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

LAW OF THE SEA
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

Oceanography and the Law of the Sea,
W78-00787 6E

LC50
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

LD50
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

LEACHING
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

LEAVES
Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves, (In Russian),
W78-00744 2I

LEGAL ASPECTS
State Legislative Response to the Central Arizona Project,
W78-00707 6E

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

LEGISLATION
Omnibus Water Resources Development Act of 1976.
W78-00650 6E

Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

The Role of State Legislation in Ground Water Management,
W78-00658 4B

Permits for Diversion, Transfer, Appropriation of Water from Interstate Streams; Stored Water; Waste Water.
W78-00665 6E

Use of Water for Watering Livestock.
W78-00666 6E

Reservoirs.
W78-00667 6E

Interstate Waters - Boulder Canyon Project.
W78-00794 6E

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

LESLIE MATRIX
Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

LETHAL LIMIT
Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

LIABILITY
The Role of Insurance in Environmental Litigation,
W78-00789 6F

LIDAR
Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

LIFE CYCLES
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

LIFE HISTORY STUDIES
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

LIGNIN
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

LINEAR PROGRAMMING
Markovian Programming for Flow Regulation,
W78-00621 4A

An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

Chance Constrained Model of Water Resources Systems,
W78-00641 4A

General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

LINEAR SYSTEMS ANALYSIS
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

LIPIDS
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

LIQUID WASTES
Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

LITTLE NIXON CREEK (TN)
Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

LIVERS
Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

LIVESTOCK
Use of Water for Watering Livestock.
W78-00666 6E

LOCH ETIV (SCOTLAND)
Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

LODI (NJ)
Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

LOG-PEARSON TYPE III DISTRIBUTION
Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

LONG ISLAND (NY)
Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

LONG ISLAND SOUND
Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

LONG ISLAND SOUND (NY)
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

LONG-TERM PLANNING
Control of Water Pollution in New York City,
W78-00796 6E

LOOKOUT POINT DAM (ORE)
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

LOS ANGELES (CALIF)
Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

LOUISIANA
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

LUMBERING
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

LYSIMETERS
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

MACOMA
Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

MACROSCOPIC DISPERSION
Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

MAINE
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

MALLARD DUCK
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

MANAGEMENT
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

MANCOS SHALE (COLO-UTAH)
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

MANGANESE
Hawaii and the Manganese Nodule Industry,
W78-00839 6G

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

MANGANESE NODULE INDUSTRY
Hawaii and the Manganese Nodule Industry,
W78-00839 6G

MAPPING
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

MAPS
Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

MARINAS
The Harris Floating Breakwater,
W78-00852 8B

Workshop II: Floating Breakwaters for Small Boat Marinas.
W78-00857 8B

MARINE BACTERIA
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

MARINE BIOLOGY
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

MARINE ECOSYSTEMS
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

MARINE ENVIRONMENT
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

MARINE MICROORGANISMS
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

MARKING TECHNIQUES
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

MARKOV PROCESS
General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

MARKOV PROCESSES
Markovian Programming for Flow Regulation,
W78-00621 4A

MARYLAND
Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

MASON TRAPS
Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

MASS SPECTROMETRY
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

MASS TRANSFER
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Atmospheric Reaeration in a Lake,
W78-00561 5G

MASSACHUSETTS
Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

MATHEMATICAL MODELS
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

Computational Hydraulics: An Alternative View,
W78-00524 5B

Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

Subroutine for Settling Velocities of Spheres,
W78-00528 2J

A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

Some Water Resource System Studies in the UK,
W78-00636 4B

A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

Modelling for Water Resource Systems Planning,
W78-00648 6A

An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

MATHEMATICAL STUDIES
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

MAUMEE RIVER BASIN (OHIO)
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

MAUNABO VALLEY (P R)
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

MEASUREMENT
A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

MEAT PACKING WASTES
An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

MEDITERRANEAN OCEAN
International Ocean Institute,
W78-00780 6E

MEMBRANE PROCESSES
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

MEMBRANES
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

MENOMINEE RIVER (WI AND MI)
Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

MERCURIC CHLORIDE
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

MERCURY
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

MESOSCALE WIND FIELDS
Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

METABOLIC RATE
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

METABOLISM
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

METALS
Effects of Produced Waters on the Marine Environment,
W78-00834 5C

Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

METEOROLOGICAL DATA
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

METEOROLOGY
Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

METHANE
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

METHODOLOGY
Environmental Assessment Perspectives,
W78-00773 5G

METHOXYCHLOR
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

METHYLMERCURY COMPOUNDS
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

MICHIGAN
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

MICROBIAL DEGRADATION
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

Effects of Produced Waters on the Marine Environment,
W78-00834 5C

MICROORGANISMS
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

MID-SNAKE RIVER (IDAHO)
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

MINE ACIDS
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

MINE WASTES
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

MINERAL DISSOLUTION (SOILS)
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

MINERAL EXPLORATION
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

MINIMUM WATER USE FIXTURES
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

MINING
Hawaii and the Manganese Nodule Industry,
W78-00839 6G

MINNOW
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

MINNOWS
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

MISSISSIPPI
The Distribution of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

MISSISSIPPI RIVER
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

MISSOURI RIVER
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

MIXED-INTEGER PROGRAMMING
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

MODEL DISCRIMINATION TECHNIQUES
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

MODEL STUDIES
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

Design of Trend Monitoring Networks,
W78-00695 5A

Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

1975 Annual Report.
W78-00721 5A

Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

Atmospheric Dispersion Models for Environmental Pollution Applications,
W78-00729 5A

Urban Diffusion Problems,
W78-00730 5A

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

Plume Rise Predictions,
W78-00736 5A

Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

Predicted and Observed Cooling Tower Plume Rise and Visible Plume Length at the John E. Amos Power Plant,
W78-00739 5A

A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

Estimation of Downwash Effects,
W78-00741 5A

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

Probabilistic Substantiation of Land Improvement Regulation, (In Russian),
W78-00851 4A

MOISTURE CONTENT
Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves, (In Russian),
W78-00744 2I

The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

MOLECULAR NITROGEN
Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

MOLECULAR ROTATION
Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

MOLECULAR STRUCTURE
Hydrocarbons in the Water Column,
W78-00574 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

MOLLUSKS
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

MONITORING
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Design of Trend Monitoring Networks,
W78-00695 5A

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

MONOMYCTIC LAKES
The Medusa Craspedacusta Sowerbyi Lankester (Limnomedusae) in Lake Sirio (IVrea, Torino), (In Italian),
W78-00846 2H

MONTANA
Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

MONTHLY
Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

MORTALITY
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

MOSQUITOFISH
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

MOSQUITOS
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

MOVEMENT
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

MUD
Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

MULTIOBJECTIVE PLANNING
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

MULTIPLE OBJECTIVES
Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

Modelling for Water Resource Systems Planning,
W78-00648 6A

MULTIPLE-PURPOSE RESERVOIRS
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

Chance Constrained Model of Water Resources Systems,
W78-00641 4A

MUNICIPAL WATER
Regulations: Reactions and Resolution.
W78-00656 5G

MURRE
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

MUSSELS
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

MUTAGENS
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

NALED
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

NAPHTHALENE
Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

NAPHTHALENES
Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

NATIONAL ENVIRONMENTAL POLICY ACT
Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

NATIONAL FLOOD INSURANCE PROGRAM
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Coastal Zone Management Program Development Grants.
W78-00777 2L

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM
Clean Water Progress - Yes, Speed - No,
W78-00791 5G

NATURAL AQUATIC SYSTEMS
A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

NATURAL WATERS
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

NAVAJO INDIAN RESERVATION (ARIZ)
Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

NAVIGABLE RIVERS
Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

NAVIGABLE WATERS
Captain Soma Boat Line V. City of Wisconsin Dells (Reasonable Obstructions to Navigable Streams).
W78-00668 6E

United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

NAVIGATION OBSTRUCTIONS
United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

NEGLIGENCE
The Role of Insurance in Environmental Litigation,
W78-00789 6F

NETHERLANDS
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

NETWORK DESIGN
Design of Trend Monitoring Networks,
W78-00695 5A

NETWORKS
SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

NEUTRON-CAPTURE TECHNIQUE
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

NEUTRON PROBE
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

NEVADA
Permits for Diversion, Transfer, Appropriation of Water from Interstate Streams; Stored Water; Waste Water.
W78-00665 6E

Use of Water for Watering Livestock.
W78-00666 6E

Reservoirs.
W78-00667 6E

Interstate Waters - Boulder Canyon Project.
W78-00794 6E

NEW HAMPSHIRE
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

NEW JERSEY
Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

State V. Mizrahi (Authority of Municipality to Charge Public for Use of Beach).
W78-00795 6E

NEW MELONES RESERVOIR (CAL)
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

NEW MEXICO
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

NEW YORK
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

NEW YORK

Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

Control of Water Pollution in New York City,
W78-00796 6E

NEW YORK BIGHT
Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

NICKEL
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

NITRATE-NITROGEN
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

NITRATES
On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

NITRIFICATION
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

NITROGEN
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

NITROGEN COMPOUNDS
Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

NON-LINEAR SYSTEMS
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

NON-STRUCTURAL ALTERNATIVES
Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

NONPENETRATING WELLS
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

NONPOINT SOURCES (POLLUTION)
Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

NORTH CAROLINA
Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

NORTH-CENTRAL UNITED STATES
Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

NORTH DAKOTA
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

NORTH FORK OBION RIVER (TN)
North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

NORTH NASHUA RIVER (MA)
Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

NORTH SEA
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

NORTH SLOPE
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

NORTHERN BLACK MESA AREA (ARIZ)
Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

NUCLEAR MOISTURE METERS
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

NUCLEAR POWERPLANTS
Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

NUISANCE (LEGAL ASPECTS)
Captain Soma Boat Line V. City of Wisconsin Dells (Reasonable Obstructions to Navigable Streams).
W78-00668 6E

NUMERICAL ANALYSIS
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

NUTRIENT REMOVAL
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

NUTRIENTS
Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

OBSERVATION WELLS
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

OCEAN DUMPING
Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

OCEANOGRAPHY
Oceans '77 Conference Record.
W78-00827 5G

OCEANS
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

Oceans '77 Conference Record.
W78-00827 5G

ODRA RIVER (CZECHOSLOVAKIA)
Chance Constrained Model of Water Resources Systems,
W78-00641 4A

OFFSHORE PLATFORMS
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

OHIO
Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

Republic Steel Corporation V. Train (Environmental Protection Agency Permit Objection Improper Where no Guidelines Available).
W78-00792 6E

A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

OIL
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

OIL POLLUTION
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

Hydrocarbons in the Water Column,
W78-00574 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

OIL POLLUTION

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Determination of the Leeway of Oil Slicks,
W78-00609 5A

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

United States V. Hamel (Gasoline as a Pollutant Under the Federal Water Pollution Control Act).
W78-00797 6E

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

OIL SLICKS

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Determination of the Leeway of Oil Slicks,
W78-00609 5A

OIL SPILLS

Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Determination of the Leeway of Oil Slicks,
W78-00609 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

OIL WASTES
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

OIL-WATER INTERFACES
Hydrocarbons in the Water Column,
W78-00574 5B

OILY WATER
Hydrocarbons in the Water Column,
W78-00574 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

OKLAHOMA
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

OLEFINS
Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

ON-SITE DATA COLLECTIONS
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

ON-SITE INVESTIGATIONS
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

ON-SITE TESTS
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

ONISIMUS
Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

OPEN CHANNEL FLOW
Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

OPERATING SETS
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

OPERATION AND MAINTENANCE
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

OPERATIONS
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

OPERATIONS RESEARCH
Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

OPTIMIZATION
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

ORAPA (BOTSWANA)
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

OREGON
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

ORGANIC COMPOUNDS
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

ORGANIC PESTICIDES
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

ORGANIZATIONS
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

Land Drainage in England and Wales,
W78-00691 4A

ORGANOMERCURY
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

ORGANOPHOSPHOROUS PESTICIDES
Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

ORIFICES
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

OSMOREGULATION
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

OSMOSIS
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

OTTAWA RIVER
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

OTTER CREEK (OHIO)
A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

OTTERS
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

OUTER CONTINENTAL SHELF
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

Oceans '77 Conference Record.
W78-00827 5G

Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

Effects of Produced Waters on the Marine Environment,
W78-00834 5C

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

CEPEX Hardware: (Now and in the Future),
W78-00837 5C

Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

Hawaii and the Manganese Nodule Industry,
W78-00839 6G

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

OUTLET WORKS

Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

OXIDATION

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

OXIDATION LAGOONS

Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

OXIDATION-REDUCTION POTENTIAL

The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

OXYGEN

Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

OXYGEN REQUIREMENTS

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

OXYGENATION

Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

Atmospheric Reaeration in a Lake,
W78-00561 5G

Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

OYSTERS

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

PACIFIC OCEAN

On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

PALAEMONETES

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

PALAU

Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

PALEOGRAPHIC ANALYSIS

General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

PALM SPRINGS (CALIF)

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

PARAFFINS

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

PARATHION

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

PARTICLE SHAPE

Hydrocarbons in the Water Column,
W78-00574 5B

PARTICLE SIZE

Hydrocarbons in the Water Column,
W78-00574 5B

Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

PATENTS

Review of C.E. Jacob's Doublet Well,
W78-00720 8B

PATH OF POLLUTANTS

Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

PEAK DISCHARGE

Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

Flood Plain Information: East River and Tributaries, City of Green Bay and Brown County, Wisconsin.
W78-00761 4A

Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

PENALTIES (LEGAL)

United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

PENNSYLVANIA

Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

PENTACHLOROPHENOL

Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

PERMEABILITY

Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

PERMITS

Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Republic Steel Corporation V. Train (Environmental Protection Agency Permit Objection Improper Where no Guidelines Available).
W78-00792 6E

State V. Mizrahi (Authority of Municipality to Charge Public for Use of Beach).
W78-00795 6E

Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

PERMSELECTIVE MEMBRANES

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

PERSISTENCE

Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

PESTICIDE KINETICS

Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

PESTICIDE RESIDUES

The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

PESTICIDE TOXICITY

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

PETROLEUM HYDROCARBONS

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

PHAGOCYTES

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

PHENOLS

Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

PHOSPHATES

Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

PHOSPHORUS

Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

PHOSPHORUS REMOVAL

Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

PHOTOSYNTHESIS

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

PIERS

Coalition for Lower Beaufort County V. Alexander (Coastal Construction Permits and the National Environmental Policy Act).
W78-00664 6E

United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

PIPELINES

Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

PLANKTON

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

PLANNING

The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

PLANNING

Modelling for Water Resource Systems Planning,
W78-00648 6A

An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

Coastal Zone Management Program Development Grants.
W78-00777 2L

Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

PLANT GROWTH

Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

PLANT PHYSIOLOGY

The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

PLUMES

1975 Annual Report.
W78-00721 5A

Plume Rise Predictions,
W78-00736 5A

POLICY ALTERNATIVES

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

POLITICAL ASPECTS

State Legislative Response to the Central Arizona Project,
W78-00707 6E

POLLUTANT IDENTIFICATION

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

POLLUTANTS

United States V. Hamel (Gasoline as a Pollutant Under the Federal Water Pollution Control Act).
W78-00797 6E

POLLUTION ABATEMENT

Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

POLYCHAETES

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

POLYCHLORINATED BIPHENYLS

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

POLYCYCLICS AROMATICS

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

POMPANO BEACH (FLA)

Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

PONDWEEDS

Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

POPULATION

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

PORE SIZE (SOILS)

Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

POROSITY

Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

POROUS CUP

A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

POROUS MEDIA

Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

POTABLE WATER

How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

Regulations: Reactions and Resolution.
W78-00656 5G

POULTRY

Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

POULTRY PROCESSING WASTES

Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

POWDER RIVER BASIN (WYO)

The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

POWER PLANTS

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

POWERPLANTS

Plume Rise Predictions,
W78-00736 5A

PRAWNS

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

PRE-TREATMENT (WATER)

The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

PRECIPITATION (ATMOSPHERIC)

Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

Water Conditions and Flood Events in California, Water Year 1975-76.
W78-00718 2E

PRECIPITATION EXCESS

A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

PREDATION

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

PREFERENCE (WATER RIGHTS)

Nettleton v. Higginson (Constitutionality of Water Distribution Priorities in Times of Scarcity).
W78-00673 6E

PREMIUM RATES

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

PRESSURE

Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

PRESSURE HEAD
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

PRESSURE RECOVERY LENGTH
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

PRIMARY PRODUCTIVITY
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

PRIOR APPROPRIATION
The Role of State Legislation in Ground Water Management,
W78-00658 4B

Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

PROBABILITY
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

PRODUCED WATER
Effects of Produced Waters on the Marine Environment,
W78-00834 5C

PRODUCTIVITY
A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

PROJECTS
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

PROPANE
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

PROPDEMM MODEL
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

PROTECTION
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

PRUDOE BAY
Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

PSEUDOMONAS
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

PUBLIC RIGHTS
State V. Mizrahi (Authority of Municipality to Charge Public for Use of Beach).
W78-00795 6E

PUDGET SOUND (WASH)
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00817 5B

PUERTO RICO
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

PUGET SOUND (WASHINGTON)
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

PULMONATES
Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

PULP WASTES
Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

PULSED WATER APPLICATION
Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

PULSES
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

PUMPING
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

PUMPING PLANTS
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

QUALITY CONTROL
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

RADAR
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

RADIATION
Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

Photographic Assessment of Deciduous Forest Radiation Regimes,
W78-00725 2B

Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

RADIOACTIVITY TECHNIQUES
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

RADIOCHEMICAL ANALYSIS
The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

RADIOISOTOPES
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

RAIN GAGES
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

RAINBOW TROUT
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

RAINDROPS
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

RAINFALL
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

RAMAN SPECTROSCOPY
Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

RANGES
Use of Water for Watering Livestock.
W78-00666 6E

RATES
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

RATES OF APPLICATION
Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

RATIONING (WATER)
The Drought,
W78-00807 2B

REAERATION
Atmospheric Reaeration in a Lake,
W78-00561 5G

REAERATION COEFFICIENT
Atmospheric Reaeration in a Lake,
W78-00561 5G

REAL-TIME OPERATION
Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

RECHARGE PONDS
Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

RECIRCULATED WATER
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

RECREATION FACILITIES
Success Stories in Multiple Use,
W78-00660 6B

State V. Mizrahi (Authority of Municipality to Charge Public for Use of Beach).
W78-00795 6E

REEFS
Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

REGIONAL ANALYSIS
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

REGIONAL SEWERAGE SYSTEMS
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

REGIONS
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

REGRESSION ANALYSIS
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

REGULATION
Markovian Programming for Flow Regulation,
W78-00621 4A

Regulations: Reactions and Resolution.
W78-00656 5G

The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

Coastal Zone Management Program Development Grants.
W78-00777 2L

Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

Probabilistic Substantiation of Land Improvement Regulation, (In Russian),
W78-00851 4A

REMOTE SENSING
Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

RENDERING WASTES
Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

Rendering Plant Waste Treatment Studies,
W78-00513 5A

REPRODUCTION
Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

RESEARCH AND DEVELOPMENT
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

RESEMBLANCE MEASURES
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

RESERVOIR CONSTRUCTION
Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

RESERVOIR DESIGN
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

RESERVOIR OPERATION
Markovian Programming for Flow Regulation,
W78-00621 4A

Chance Constrained Model of Water Resources Systems,
W78-00641 4A

RESERVOIR PERMITS
Reservoirs.
W78-00667 6E

RESERVOIR STORAGE
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

RESERVOIR YIELD
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

RESERVOIRS
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

Feasibility of Interbasin Water Transfer,
W78-00628 4A

General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

Reservoirs.
W78-00667 6E

Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

RESOURCE MANAGEMENT
New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

RESOURCES DEVELOPMENT
Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

Hawaii and the Manganese Nodule Industry,
W78-00839 6G

1974 Floating Breakwaters Conference Papers.
W78-00840 8B

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Workshop I: Future Uses of Floating Breakwaters.
W78-00856 8B

Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

RESPIRATION

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

RETENTION

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

REYNOLDS NUMBER

Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

RICEFISH

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

RIPARIAN RIGHTS

Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

RISKS

Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

RIVER BASIN DEVELOPMENT

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

RIVER BASINS

Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

RIVER BEDS

Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

RIVER FLOW

Markovian Programming for Flow Regulation,
W78-00621 4A

RIVER REGULATION

Some Water Resource System Studies in the UK,
W78-00636 4B

RIVERS

Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

Chance Constrained Model of Water Resources Systems,
W78-00641 4A

A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

RIVERS AND HARBORS ACT

United States V. Bowen (Intent Requirement for Prosecution Under 1899 Rivers and Harbors Act).
W78-00669 6E

ROMANIA (BANEASA-BUCHAREST)

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

ROMANIA (CALMATUI RIVER)

The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

ROOT SYSTEMS

Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

RUNOFF

Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

SAALER BODDEN (E GERMANY)

Ecological-Faunistic Investigations on the Meiobenthos of the Saaler Bodden, GDR, Baltic Sea, (In German),
W78-00501 2L

SADDLE RIVER (NJ)

Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

SAFE DRINKING WATER ACT

How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

Regulations: Reactions and Resolution.
W78-00656 5G

SALINE LAVA AQUIFER

Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

SALINE SOILS

Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

SALINE WATER

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

SALINE WATER BARRIERS

Review of C.E. Jacob's Doublet Well,
W78-00720 8B

SALINE WATER INTRUSION

A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

Review of C.E. Jacob's Doublet Well,
W78-00720 8B

SALINITY

Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

SALMON
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

SALMONIDS
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

SALT MARSHES
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

The Distribution of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

SALT RELEASE
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

SALT TOLERANCE
Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

SALTS
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

SALUDA RIVER (SC)
Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

SAMPLING
On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

SAN FRANCISCO BAY (CALIF)
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

SANDS
The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

Alluvial Channel Bedforms,
W78-00826 2J

SANTO-PARMENSE LAKE (ITALY)
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

SAPROLITES
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

SATURATED SOILS
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

SATURATION
Hydrocarbons in the Water Column,
W78-00574 5B

SCREENS
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

SEA ICE
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

SEA LEVEL
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

SEA WATER
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Arctic Hydrocarbon Biodegradation,
W78-00600 5B

SEABED MINING
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

SEABREAKERS
The 'Seabreaker' Floating Breakwater,
W78-00850 8B

SEASONAL
The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

SEATTLE (WASHINGTON)
Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

SEDIMENT DISCHARGE
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

SEDIMENT DISTRIBUTION
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

SEDIMENT MINERALOGY
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

SEDIMENT TRANSPORT
Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

SEDIMENT-WATER INTERFACES
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

SEDIMENTATION
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

SEDIMENTATION RATES
Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

SEDIMENTS
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

SEEPAGE

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

SELENIUM

Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

SEMIPERMEABLE MEMBRANES

Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

SEPTIC TANKS

Environmental Effects of Septic Tank Systems,
W78-00751 5C

SETO INLAND SEA (JAPAN)

Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

SETTLING BASINS

Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

SETTLING VELOCITY

Subroutine for Settling Velocities of Spheres,
W78-00528 2J

SEWAGE

Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

SEWAGE EFFLUENTS

Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

SEWAGE TREATMENT

Success Stories in Multiple Use,
W78-00660 6B

SHALES

Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

SHINERS

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

SHORE PROTECTION

Coastal Zone Management Program Development Grants.
W78-00777 2L

Problems of Coastal Management,
W78-00801 6E

SHRIMP

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

SIMULATION ANALYSIS

Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

SIPHONS

Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

SIZE

Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

SKYLAB DATA

Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

SLUDGE DISPOSAL

Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

SLUDGE TREATMENT

Control of Water Pollution in New York City,
W78-00796 6E

SLUG TESTS

Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

SMALL WATERSHEDS

Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

SMOG

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

SNAILS

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

SNOW SURVEYS
Water Conditions in California, Basic Data Supplement.
W78-00545 2B

SOCIAL ANALYSIS
Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

SOCIAL IMPACT
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

SOCIAL IMPACTS
Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

SOCKEYE SALMON
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

SODIUM
Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

SOIL ANALYSIS
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

SOIL CHEMICAL PROPERTIES
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

SOIL CHEMISTRY
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

SOIL DENSITY
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

SOIL DETACHMENT
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

SOIL MOISTURE
Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves, (In Russian),
W78-00744 2I

The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

SOIL MOISTURE METERS
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

SOIL MOISTURE PRESSURE
Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

SOIL PACKING
Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

SOIL PERMEABILITY
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

SOIL PRESSURE
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

SOIL PROPERTIES
Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

SOIL RECLAMATION
An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

SOIL STRENGTH
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

SOIL TILT
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

SOIL WATER
Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

SOIL WATER MOVEMENT
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

SOLAR RADIATION
Photographic Assessment of Deciduous Forest Radiation Regimes,
W78-00725 2B

Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

SOLUBILITY
Hydrocarbons in the Water Column,
W78-00574 5B

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

SOLUTES
Hydrocarbons in the Water Column,
W78-00574 5B

SOUNDS
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

SOUTH CAROLINA
Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

SOUTH DAKOTA
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

SOUTH RIVER WATERSHED (VA)
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

SOUTHERN BLACK MESA AREA (ARIZ)
Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

SOUTHERN CALIFORNIA
Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

SPAWNING
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

SPECIES CLASSIFICATION
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

SPECIES DISTRIBUTION
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

SPECTROPHOTOMETRY
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

SPECTROSCOPY
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

SPILLWAYS
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

SPRUCE RUN RESERVOIR (NJ)
Atmospheric Reaeration in a Lake,
W78-00561 5G

STANDARDS
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

STATE GOVERNMENTS
The Role of State Legislation in Ground Water Management,
W78-00658 4B

STATE JURISDICTION
Republic Steel Corporation V. Train (Environmental Protection Agency Permit Objection Improper Where no Guidelines Available).
W78-00792 6E

STATISTICAL METHODS
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

STATISTICAL MODELS
Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

STILLING BASIN
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

STOCHASTIC PROCESSES
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

Markovian Programming for Flow Regulation,
W78-00621 4A

General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

STOCK WATER
Use of Water for Watering Livestock.
W78-00666 6E

STONEY BRANCH (SC)
Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

STORAGE COEFFICIENT
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

STORM DRAINS
Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

STORM RUNOFF
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

STORM WATER
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

STREAM EROSION
Armoring Process in Degrading Streams,
W78-00527 2J

STREAM POLLUTION
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

STREAM REGIMES
Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

STREAMBEDS
Alluvial Channel Bedforms,
W78-00826 2J

STREAMFLOW
A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

STREAMS
Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

STREETER-PHELPS EQUATION
SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

STRIPED BASS
Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

SUBLETHAL EFFECTS
Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

SUBLETHAL EFFECTS

Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

SUBMERGED LANDS
Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

SUCCESSION
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

SUGAR CREEK (TN)
Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

SULFUR
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

SULFUR COMPOUNDS
The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

SULFUR DIOXIDE
Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

SULPHUR FORK (TN)
Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

SUPERPORTS
Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

SURFACE-GROUNDWATER RELATIONSHIPS
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

SURFACE WATER
Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

SURFACE WATERS
Some Water Resource System Studies in the UK,
W78-00636 4B

Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

SURROGATE WORTH TRADE-OFF METHOD
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

SURVEYS
Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

SUSPENDED SOLIDS
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

SUSPENSION
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

SWEDEN
Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

SYSTEMATICS
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

SYSTEMS ANALYSIS
Some Water Resource System Studies in the UK,
W78-00636 4B

TAGGING
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

TANNERY WASTES
Tannery Waste Management,
W78-00512 5D

TAR
Hydrocarbons in the Water Column,
W78-00574 5B

TAUTOG
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

TECHNOLOGY
Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Oceans '77 Conference Record.
W78-00827 5G

TECHNOLOGY ASSESSMENT
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

TECHNOLOGY TRANSFER
Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

TEMPERATURE
Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

TENNESSEE
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

TERRITORIAL SEAS (JURISDICTION)
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

TERRITORIAL WATERS
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

International Ocean Institute,
W78-00780 6E

TEST WELLS
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

TESTACEA
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

TESTING PROCEDURES
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

TETROONS
Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

TEXAS
Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

THERMAL CONDUCTIVITY
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

THERMAL INSULATION
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

THERMAL POLLUTION
Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

THERMAL SPRINGS
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

THERMAL STRATIFICATION
The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

THERMAL STRESS
Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

THUNDERSTORMS
Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

TIDAL EFFECTS
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

TILEFISH
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

TIME-DEPENDENT CONSOLIDATION
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

TIME LAG
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

TIME SERIES ANALYSIS
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

TISSUE ANALYSIS
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

TOLUENE
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

TOPOGRAPHY
Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

TOXICITY
Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems.
W78-00572 5C

Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

TOXINS

Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

TRACE ELEMENTS

Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

TRACE METALS

Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

TRACERS

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

TRANSMISSIVITY

Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

TRANSPIRATION

Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

TRANSPORTATION

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

TREATIES

Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

International Ocean Institute,
W78-00780 6E

The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

TREATMENT FACILITIES

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

TRICHODERMA VINDE

Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

TRICKLING FILTERS

Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

TROUT

Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

TURBULENCE

Atmospheric Reaeration in a Lake,
W78-00561 5G

Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

TURBULENT FLOW

Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

TYPE CURVES

Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

ULUOVA PLAIN (TURKEY)

Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

UNCONFINED-CONFINED AQUIFERS

Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

UNIT TRAINS

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

UNITED NATIONS

International Ocean Institute,
W78-00780 6E

The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

UNITED STATES

The Drought,
W78-00807 2B

A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

UPPER COLORADO RIVER BASIN

Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

UPPSALA (SWEDEN)

Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

URBAN DIFFUSION MODELS

Urban Diffusion Problems,
W78-00730 5A

URBAN DRAINAGE

Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

URBAN GROWTH POLICY
An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

URBAN HYDROLOGY
Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

URBAN RUNOFF
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

URBAN STORM WATER QUALITY
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

URBAN STORMWATER DISCHARGES
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

URBAN WATERSHEDS
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

URBANIZATION
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

USSR (INTERNATIONAL BIOLOGICAL PROGRAMS)
A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

USSR (KANEV WATER STORAGE BASIN)
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

USSR (NARACHANSK LAKES)
Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Narachansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

USSR (OB FLOOD PLAIN)
An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

UTAH
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

UTILITIES
How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

Connecticut Light and Power Company V. Federal Power Commission (Navigability - Defined for Licensing of Hydroelectric Projects).
W78-00793 6E

VACUUM
A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

VANDA-TRICOLOR
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

VAPOR PRESSURE
Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

VEGETATION
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

VELOCITY DISTRIBUTION
Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

VERTICAL STRATIFICATION
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

VIRGIN RIVER BASIN (UTAH-ARIZ-NEV)
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

VIRUSES
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

VOLATILITY
Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

WALES
Land Drainage in England and Wales,
W78-00691 4A

WALKER BRANCH WATERSHED (TENN)
Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

WASHINGTON
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

WASHINGTON SUBURBAN SANITARY COMMISSION
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

WASTE ASSIMILATION CAPACITY
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

WASTE DISPOSAL
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

Environmental Effects of Septic Tank Systems,
W78-00751 5C

Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

WASTE FLOW REDUCTION
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

WASTE IDENTIFICATION
An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

WASTE WATER DISPOSAL
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

WASTE WATER (POLLUTION)
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

Clean Water Progress - Yes, Speed - No,
W78-00791 5G

WASTE WATER TREATMENT
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

Tannery Waste Management,
W78-00512 5D

Rendering Plant Waste Treatment Studies,
W78-00513 5A

Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

WATER ALLOCATION (POLICY)
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

WATER ANALYSIS
Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

WATER BALANCE
The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

WATER CHEMISTRY
Hydrocarbons in the Water Column,
W78-00574 5B

The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

WATER CIRCULATION
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

Determination of the Leeway of Oil Slicks,
W78-00609 5A

Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

WATER CONSERVATION
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

Water and Land Development--Wells.
W78-00672 6E

WATER COOLING
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

WATER DEMAND
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

WATER DEVELOPMENT COSTS
Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

WATER DISTRICTS
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

Nettleton v. Higginson (Constitutionality of Water Distribution Priorities in Times of Scarcity).
W78-00673 6E

WATER LAW
Uniformity Among Weather Modification Laws,
W78-00745 2B

WATER LEVEL FLUCTUATIONS
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

WATER MANAGEMENT (APPLIED)
Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

State Legislative Response to the Central Arizona Project,
W78-00707 6E

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

WATER MODIFICATION LOSS
Uniformity Among Weather Modification Laws,
W78-00745 2B

WATER PERMITS
Permits for Diversion, Transfer, Appropriation of Water from Interstate Streams; Stored Water; Waste Water.
W78-00665 6E

Reservoirs.
W78-00667 6E

WATER POLICY
Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

State Legislative Response to the Central Arizona Project,
W78-00707 6E

WATER POLLUTION
Computational Hydraulics: An Alternative View,
W78-00524 5B

Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

The Role of Insurance in Environmental Litigation,
W78-00789 6F

Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

WATER POLLUTION CONTROL

Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

Clean Water Progress - Yes, Speed - No,
W78-00791 5G

Control of Water Pollution in New York City,
W78-00796 6E

Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

1974 Floating Breakwaters Conference Papers.
W78-00840 8B

WATER POLLUTION EFFECTS

An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

Effects of Produced Waters on the Marine Environment,
W78-00834 5C

CEPEX Hardware: (Now and in the Future),
W78-00837 5C

Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

WATER POLLUTION SOURCES

An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

Environmental Effects of Septic Tank Systems,
W78-00751 5C

Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

Workshop I: Future Uses of Floating Breakwaters.
W78-00856 8B

Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

WATER QUALITY

Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

Farrugia v. Frederick (Denial of Canal Permit Based on Adverse Effects Upon Water Quality).
W78-00670 6E

Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

Design of Trend Monitoring Networks,
W78-00695 5A

Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

WATER QUALITY CONTROL

Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

WATER QUALITY IMPROVEMENT ACT
Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

WATER QUALITY STANDARDS
A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

Republic Steel Corporation V. Train (Environmental Protection Agency Permit Objection Improper Where no Guidelines Available).
W78-00792 6E

WATER RESOURCES
Water Conditions in California, Basic Data Supplement.
W78-00545 2B

A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

Feasibility of Interbasin Water Transfer,
W78-00628 4A

Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

Some Water Resource System Studies in the UK,
W78-00636 4B

The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

Chance Constrained Model of Water Resources Systems,
W78-00641 4A

A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

Modelling for Water Resource Systems Planning,
W78-00648 6A

Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

Water Conditions and Flood Events in California, Water Year 1975-76.
W78-00718 2E

An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

WATER RESOURCES DEVELOPMENT
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

Omnibus Water Resources Development Act of 1976.
W78-00650 6E

Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

Oceanography and the Law of the Sea,
W78-00787 6E

A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

WATER RESTRICTION INDEX
A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

WATER RIGHTS
Montana Department of Natural Resources and Conservation v. Intake Water Company (Inchoate Right to Appropriate Water Despite Delay of Actual Construction).
W78-00674 6E

WATER SAMPLING
A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

WATER SAVING DEVICES
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

WATER SHORTAGE
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

The Drought,
W78-00807 2B

WATER SOURCES
Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

WATER SPREADING
Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

WATER STRUCTURE
Sierra Club v. Morton (Requirements of Final Environmental Impact Statements for Dam Projects).
W78-00671 6E

WATER SUPPLY
Feasibility of Interbasin Water Transfer,
W78-00628 4A

Regulations: Reactions and Resolution.
W78-00656 5G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

WATER SUPPLY DEVELOPMENT
Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

WATER TABLE
Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

WATER TEMPERATURE
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

WATER TRANSPORT (PLANTS)
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

WATER UTILIZATION
Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

WATER WELLS
Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

WATER YIELD
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

WATER YIELD IMPROVEMENT
Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

WATERCOURSES (LEGAL ASPECTS)
Deeds: Description of Land Conveyed by Reference to River or Stream as Carrying to Thread or Center or Only to Bank Thereof - Modern Status,
W78-00798 6E

WATERSHED DISTRICTS (MISS)
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

WATERSHED MANAGEMENT
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

WATERSHEDS (BASINS)
Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

Land Drainage in England and Wales,
W78-00691 4A

WEATHER DATA
Determination of the Leeway of Oil Slicks,
W78-00609 5A

Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

WEATHER MODIFICATION
Uniformity Among Weather Modification Laws,
W78-00745 2B

WEATHERING
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

WELL REGULATIONS
Water and Land Development--Wells.
W78-00672 6E

WELLS
Water and Land Development--Wells.
W78-00672 6E

Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

Review of C.E. Jacob's Doublet Well,
W78-00720 8B

WEST ANTARCTIC ICE SHEET
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

WETLANDS
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

WHITE STURGEON
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

WILLAMETTE RIVER
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

WIND-GENERATED WAVES
The 'Seabreaker' Floating Breakwater,
W78-00850 8B

WIND VELOCITY
Determination of the Leeway of Oil Slicks,
W78-00609 5A

WINDS
Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

Standard Deviation of Wind Direction as a Function of Time; Three Hours to Five Hundred Seventy-Six Hours,
W78-00733 2B

WINTER
The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

WISCONSIN
Captain Soma Boat Line V. City of Wisconsin Dells (Reasonable Obstructions to Navigable Streams).
W78-00668 6E

Flood Plain Information: East River and Tributaries, City of Green Bay and Brown County, Wisconsin.
W78-00761 4A

Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

WOOD PRESERVATIVES (PESTICIDES)
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

WOOD WASTES
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

WORMS
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

WYOMING
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

XYLENE
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

ZINC
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

ZOOPLANKTON
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

AUTHOR INDEX

ABBOTT, M. B.
Computational Hydraulics: An Alternative View,
W78-00524 5B

Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

ACKER, W. C.
Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

ACKERMAN, E. A.
Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

ADAMS, A.
Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

ADEE, B. H.
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

ADELMAN, I. R.
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

ADOLPHSON, D. G.
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

AFANAS'EVA, T. V.
An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

AIDALA, D.
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

AINSWORTH, K. A.
Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

ALBERS, P. H.
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

ALEKSEENKO, L. N.
Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves. (In Russian),
W78-00744 2I

ALI, K. A-S
Armoring Process in Degrading Streams,
W78-00527 2J

ALIMOV, A. F.
A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

ALLMARAS, R. R.
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

ALTUNKAYNAK, M.
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

ALVI, S. H.
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

ANDERSON, H. R.
Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

ANDERSON, J. W.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

ANDERSON, M. A.
A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

ANDRIKOVICS, S.
Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

ARHELGER, S. D.
Arctic Hydrocarbon Biodegradation,
W78-00600 5B

ARON, G.
Feasibility of Interbasin Water Transfer,
W78-00628 4A

ATLAS, R. M.
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

BADINO, G.
The Medusa Craspedacusta Sowerbyi Lankester (Limnomedusae) in Lake Sirio (IVrea, Torino), (In Italian),
W78-00846 2H

BAES, C. F. JR.
Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

BAKER, D. E.
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

BALAFOUTAS, G. J.
Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

BARDSLEY, W. E.
A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

BARKDOLL, M. P.
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

BARNES, H. H. JR.
A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

BARNETT, S. M.
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

BARTHOLIC, J. F.
Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

BARTOSH, C. P.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

BATES, C. C.
Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

BATHALA, C. T.
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

BATU, V.
Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

BCBEAN, E. A.
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

BEAN, R. M.
Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

BEARD, L. R.
Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

BECKER, A.
Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

BENVILLE, P.
Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

BERDUGO, V.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

BERGERON, T.
Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

BERNARD, B. B.
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

BERRY, W. O.
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

BERRYHILL, H. L. JR.
Integrated Environmental Studies, South Texas Outer Continental Shelf: Approach, Techniques, Results,
W78-00869 5G

BESCHNIDT, J.
Ecological-Faunistic Investigations on the Meiobenthos of the Saaler Bodden, GDR, Baltic Sea, (In German),
W78-00501 2L

BETSON, R. P.
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

BIERI, R. H.
The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

BILLEN, G.
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

BIRTLES, A. B.
Some Water Resource System Studies in the UK,
W78-00636 4B

BISHNOI, O. P.
A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

BJORNN, T. C.
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

BLACK, B.
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

BLACK, J. H.
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

BLAYLOCK, J. W.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

BOESCH, D. F.
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

BOGARDI, I.
Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

BOND, M. T.
Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

BONNET, M.
A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

BORGESE, E. M.
International Ocean Institute,
W78-00780 6E

BORNEFF, J.
Polycyclic Aromatics in Surface and Ground Water,
W78-00702 5A

BOURNE, W. R. P.
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

BOYD, B. D.
Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

BRAMMER, J. D.
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

BRASTER, R. E.
SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

BRENT, C. R.
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

BRESLER, E.
Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

BRIDGES, W. C.
Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

BRIGGS, G. A.
Estimation of Downwash Effects,
W78-00741 5A

Plume Rise Predictions,
W78-00736 5A

Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

BRINKMANN, F. J. J.
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

BROOKS, J. M.
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

BROWN, D. W.
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

BUCHANAN, T. J.
The Drought,
W78-00807 2B

BUDZIANOWSKI, R. J.
General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

Markovian Programming for Flow Regulation,
W78-00621 4A

BULKLEY, R. V.
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

BURBANCK, W. D.
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

BURGES, S. J.
Design of Trend Monitoring Networks,
W78-00695 5A

BURNHAM, W. L.
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

BURNS, K. A.
Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

BUTTON, D. K.
Arctic Hydrocarbon Biodegradation,
W78-00600 5B

CAIRNS, J. JR.
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

CALDARONE, E. M.
Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

CALDER, J. A.
Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

CALDWELL, R. S.
Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

CANARACHE, A.
Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

CARLSON, J.
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

CARR, R. S.
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

CARTER, J.
President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

CASE, J. N.
CEPEX Hardware: (Now and in the Future),
W78-00837 5C

CASTELLINI, M. A.
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

CHAN, Y. K.
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

CHAPRA, S. C.
A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

CHARNEY, J.
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

CHARTOCK, M. A.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

CHATOCK, M. A.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

CHATTERJEE, S.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

CHAU, W. C.
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

CHAUHAN, H. S.
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

CHENG, P.
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

CHERRY, D. S.
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

CHESLER, S. N.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

CHIANG, C. H.
Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

CHOW, S-H.
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

CHOW, T. L.
A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

CHRISTENSEN, D. R.
Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

CLARK, J. A.
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

CLARK, R. E.
The Role of State Legislation in Ground Water Management,
W78-00658 4B

CLARKE, S. H. JR.
Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

CLIFFORD, D. A.
Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

CLINGAN, T. A. JR.
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

CLOTHIER, B. E.
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

COELEN, S. P.
Feasibility of Interbasin Water Transfer,
W78-00628 4A

COHERN, P. M.
Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

COLE, G.
Land Drainage in England and Wales,
W78-00691 4A

COLE, J. S.
The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

COLQUHOUN, J. R.
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

CONSTABLE, T. W.
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

COON, J. C.
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

COON, M. D.
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

COOPER, D. C.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

COOPER, H. H. JR.
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

COOPER, J. D.
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

CORKER, C. E.
Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

CORNER, E. D. S.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

CRANDALL, M. E.
Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

CREASER, E. P.
Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

CRUSE, R. M.
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

CULKOWSKI, W. M.
Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

Standard Deviation of Wind Direction as a Function of Time; Three Hours to Five Hundred Seventy-Six Hours,
W78-00733 2B

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

D'ARRUDA, J. J.
Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

DANIEL, D. L.
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

DAVIS, R. J.
Uniformity Among Weather Modification Laws,
W78-00745 2B

DAVIS, R. W.
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

DAVISON, A.
A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

DE BOODT, M.
Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

DE MENEZES, D. M.
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

DEAN, H. J.
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

DEARBORN, L. L.
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

DEGRAEVE, G. M.
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

DETHLEFSEN, V.
The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

DIEMER, J. A.
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

DIETRICH, J.
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

DIETTE, S.
Armoring Process in Degrading Streams,
W78-00527 2J

DIXON, R. M.
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

DJORDJEVIC, B.
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

DOMOKOS, M.
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

DONALDSON, E. M.
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

DRACUP, J. A.
Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

DUCKSTEIN, L.
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

DUGAN, G. L.
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

DUNCAN, J. M.
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

DUNLOP, W. J.
Environmental Effects of Septic Tank Systems,
W78-00751 5C

DUROCHER, D. F.
Environmental Assessment Perspectives,
W78-00773 5G

DYCK, W.
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

DYER, R.
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

EDELSTEN, D. J.
Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

EDWARDS, A.
Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

EHRILCH, M. G.
Jurisdictional Expansion of the Army Corps of Engineers Under Federal Water Pollution Control Act Amendments of 1972,
W78-00799 5G

EISEL, L. M.
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

EISLER, R.
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

EKIN, L. G.
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

ELLIOTT, H. A.
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

ELLIS, J.
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

EMMONS, P. J.
Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

ENGELBERT, L. E.
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

ERMAN, D.
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

EVANS, R.
Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

EVANS, W. C.
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

EYE, J. D.
Tannery Waste Management,
W78-00512 5D

EYER, J. A.
Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

FAAS, L.
Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

FABRICIUS, J.
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

FALLON, W. E.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

FARELL, C.
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

FARR, J. A.
Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

FARRAR, C. D.
Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

FENNELLY, P. F.
Environmental Assessment Perspectives,
W78-00773 5G

FERRARI, I.
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

FIELD, M. E.
Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

FLATT, P. E.
Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

FLETCHER, P. W.
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

FLORESCU, C. I.
Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

FOGEL, M. M.
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

FOREMAN, J. E.
Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

FOSTER, W. L.
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

FRALICK, C.
Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

FRIES, C. R.
Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

FRITTON, D. D.
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

FRYE, D.
A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

FUCIK, K. W.
Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

GANNON, J. E.
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

GARDE, R. J.
Armoring Process in Degrading Streams,
W78-00527 2J

GHILDYAL, B. P.
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

GIBSON, D. T.
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

GIFFORD, F. A.
Atmospheric Dispersion Models for Environmental Pollution Applications,
W78-00729 5A

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

GILBERT, B. K.
The Drought,
W78-00807 2B

GILBERT, T. L.
Success Stories in Multiple Use,
W78-00660 6B

GILES, R. H. JR.
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

GINZBURG, M. E.
Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

GLASS, R. J.
Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

GRABBE, E. M.
Hawaii and the Manganese Nodule Industry,
W78-00839 6G

GRANSTROM, M. L.
Rendering Plant Waste Treatment Studies,
W78-00513 5A

Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

GREEN, R. A.
Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

GREEN, W.
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

GREENE, H. G.
Evaluation of Geologic Hazards in OCS Petroleum Lease Areas, Southern California Continental Borderland,
W78-00870 5G

GREIG, R. A.
Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

GRIMES, K. A.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

GRONLUND, W. D.
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

GRUGER, E. H. JR.
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

GRUNDMANIS, V.
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

GUITJENS, J. C.
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

GUMP, B. H.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

GUNATILAKA, A.
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

GURVICH, V. V.
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

HAAS, N. F.
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

HALL, C. A. S.
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

HALL, R. T.
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

HAMPE, G. D.
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

HANNA, S. R.
Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

Predicted and Observed Cooling Tower Plume Rise and Visible Plume Length at the John E. Amos Power Plant,
W78-00739 5A

Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

Urban Diffusion Problems,
W78-00730 5A

HARDER, J. A.
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

HARRALD, J. R.
Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

HARRINGTON, J. J.
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

HARRIS, A. J.
The Harris Floating Breakwater,
W78-00852 8B

HARRIS, R. P.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

HASHIMOTO, Y.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

HASLET, H. G.
The 'Seabreaker' Floating Breakwater,
W78-00850 8B

HAVERKAMP, R.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

HAWKES, J. W.
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

HAYS, S. W.
The Effects of the 200 Mile United States Fishing Zone,
W78-00659 6E

HEANEY, J. P.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

HEISEY, P. G.
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

HEISINGER, J. F.
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

HENDERSON-SELLERS, B.
The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

HENRY, C. D.
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

HERTSGAARD, T.
Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

HERTZ, H. S.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

HESTER, F. J.
Outer Continental Shelf Development in the Santa Barbara Channel: Lack of Detectable Impact on Fisheries,
W78-00867 5C

HILL, W. W.
Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

HODDER, D. T.
Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

HODGINS, H. O.
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

HOEHN, R. C.
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

HOLDEMAN, J. T.
Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

HORNBECK, J. W.
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

HORNE, J. S.
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

HORST, T. J.
Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

HOSKER, R. P. JR.
Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

HOUGHTON, R. A.
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

HOUSTON, C. W.
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

HOVANESIAN, J.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

HOWARD, C. D. D.
Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

HOWARD, J. H. III.
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

HRUBEC, I. J.
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

HUANG, C. P.
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

HUBER, W. C.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

HUFFORD, G. L.
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

HUGHES, T. C.
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

HUNTER, J. V.
Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

HUNTER, R. D.
Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

HURR, R. T.
Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

HUTCHINSON, B. A.
Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

HUTCHISON, B. A.
Photographic Assessment of Deciduous Forest Radiation Regimes,
W78-00725 2B

IFEADI, C.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

JAISWAL, C. S.
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

JANIS, D.
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

JENKINS, R. G.
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

JETHWANI, M.
Control of Water Pollution in New York City,
W78-00796 6E

JONASSON, I. R.
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

JONES, C. M.
Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

JONES, L. A.
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

JONES, M. T.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

JORGENSEN, B. B.
The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

JOVANOVIC, S.
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

JURINAK, J. J.
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

KAPLAN, I. R.
Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

KARANJAC, J.
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

KARINEN, J. F.
Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

KARMELI, D.
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

KATS, K. M.
Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

KAYAMA, M.
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

KEITH, J. E.
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

KELLEY, B. J.
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

KELLOGG, R. L.
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

KENNEDY, J. H.
Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

KERR, J. P.
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

KHURSEVICH, K. G.
Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Narachansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

KICZKO, R. J.
General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

KIESSER, S. L.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

KILVINGTON, C. C.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

KIMBALL, B. A.
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

KING, K. I.
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

KING, N. E.
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

KIPP, K. L. JR.
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

KOLEVA, S.
Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

KOONS, C. B.
Effects of Produced Waters on the Marine Environment,
W78-00834 5C

KOOYMAN, G. L.
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

KORN, S.
Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

KORNFIELD, J.
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

KOS, Z.
Chance Constrained Model of Water Resources Systems,
W78-00641 4A

KOTERBA, M. T.
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

KOTTEGODA, N. T.
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

KOUNTZ, R. R.
Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

KOVACS, A.
Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

KOWALSKI, T.
Scrap Tire Floating Breakwaters,
W78-00853 8B

KRAMER, J. H.
The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

KREEB, K.
The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

KREISSL, J. F.
Environmental Effects of Septic Tank Systems,
W78-00751 5C

KUDO, A.
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

KUHNER, J.
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

LA GRONE, F. S.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

LA GROVE, F. S.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

LAGRONE, F. S.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

LAMMI, J. O.
Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

LANCASTER, J. H.
Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

LANG, M.
Control of Water Pollution in New York City,
W78-00796 6E

LARONNE, J. B.
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

LARSON, S. P.
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

LARSON, W. E.
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

LAU, L. S.
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

LAUGHLIN, R. B. JR.
Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

LAURIA, D. T.
Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

LAW, S. S. Y.
An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

LAWRENCE, J. F.
An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

LEE, DRUN-SUN
Atmospheric Reaeration in a Lake,
W78-00561 5G

LEE, R. F.
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

LEONARD, R. L.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

LETTENMAIER, D. P.
Design of Trend Monitoring Networks,
W78-00695 5A

LEVINGS, G. W.
Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

LIGHTSEY, G. R.
Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

LINDEN, D. R.
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

LINGLE, C. S.
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

LISSAUER, I. M.
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

LOCKE, G. A.
Deeds: Description of Land Conveyed by Reference to River or Stream as Carrying to Thread or Center or Only to Bank Thereof - Modern Status,
W78-00798 6E

LODI, E.
The Medusa Craspedacusta Sowerbyi Lankester (Limnomedusae) in Lake Sirio (IVrea, Torino), (In Italian),
W78-00846 2H

LOF, G. O.
Emerging Technology and Administrative Organization for Water Development,
W78-00661 6E

LOHNE, A. A.
Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

LOUCKS, D. P.
Modelling for Water Resource Systems Planning,
W78-00648 6A

LOUGHRAN, R. J.
Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

LULL, W. W.
Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

LYTLE, J. S.
Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

LYTLE, T. F.
Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

MACKENZIE, A. F.
Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

MACLEOD, W. D. JR.
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

MAGNUSSON, N. C.
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

MALINS, D. C.
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

MALLON, M. H.
Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

MANNING, M. J.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

MARANDO, V. L.
State Legislative Response to the Central Arizona Project,
W78-00707 6E

MARINER, R. H.
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

MARTIN, W.
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

MARTINELL CALLICO, J.
General Characteristics of Estuaries, (In Spanish),
W78-00848 2L

MATALAS, N. C.
A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

MATHEWSON, C. C.
Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

MATHUR, D.
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

MATT, D. R.
Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

MATTICKS, J. L.
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

MATTRAW, H. C.
Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

MAY, W. E.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

MAZEAUD, F.
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

MAZEAUD, M. M.
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

MAZOR, E.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

MCAULIFFE, C. D.
Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

MCAULIFFE, D. C.
Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

MCHAM, R. M.
Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

MCLEOD, W. R.
Modeling of Oil Spill Trajectories Using Sequential Satellite Imagery,
W78-00866 5G

MEARS, H. C.
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

MECKLENBURG, T. A.
Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

MEDINA, M. A. JR.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

MELESHCHENKO, S. I.
Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

MICHAEL, A. D.
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

MIGHELL, J. L.
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

MIKHEEVA, T. M.
Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Naruchansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

MILLER, D. R.
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

MILLER, D. S.
Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

MILLS, M. T.
Environmental Assessment Perspectives,
W78-00773 5G

MIRTSKHULAVA, TS. E.
Probabilistic Substantiation of Land Improvement Regulation, (In Russian),
W78-00851 4A

MIX, M. C.
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

MOLDENHAUER, R. E.
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

MONAGHAN, P. H.
Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

MOORE, J. L.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

MOORE, L. J.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

MORONI, A.
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

MOYNAHAN, T. J.
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

MUALEM, Y.
Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

MUELLER, S. K.
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

MULDER, J.
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

MULLINEUX, N.
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

MUNDORFF, J. C.
Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

MURRAY, J. W.
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

MYERKUL', H. U.
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

NAPPO, C. J. JR.
Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

NARASIMHAN, V. A.
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

NEELY, W. P.
A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

NEFF, J. M.
Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

NEIDHART, B.
The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

NEILSEN, G. H.
Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

NEWBOLD, J. D.
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

NICHOLAS, W. R.
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

NIELSEN, H. A.
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

NOACK, B.
Ecological-Faunistic Investigations on the Meiobenthos of the Saaler Bodden, GDR, Baltic Sea, (In German),
W78-00501 2L

NOGUCHI, T.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

NORDIN, C. F.
Alluvial Channel Bedforms,
W78-00826 2J

Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

NORTH, R. M.
A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

NOSSA, G. A.
A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

NUTBROWN, D. A.
Some Water Resource System Studies in the UK,
W78-00636 4B

NUTTER, L. J.
Bel Air Quadrangle Hydrogeology,
W78-00806 7C

Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

O'HARA, S. C. M.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

OLIVER, G. C. S.
Eyebrook Reservoir Siphon Spillway - Paper II,
W78-00743 8B

OPRICOVIC, S.
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

ORTOLANO, L.
Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

OSHIMA, Y.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

OSTERROHT, C.
Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

OVERTON, D. E.
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

OVUL, G.
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

OXMAN, B. H.
The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

PADDOCK, M. W.
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

PAIDO, R.
Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

PANAGIOTAKOPOULOS, D.
Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

PAREKH, B. M.
Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

PARLANGE, J. -Y.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

PAULSON, O. L. JR.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

PERCY, J. A.
Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

PERI, G.
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

PERKINS, L. Z.
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

PERMENTER, R. W.
Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

PESSONEY, G. F.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

PHILLIPS, C.
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

PIERCE, R. H. JR.
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

PIERCE, R. S.
Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

PLATT, R. H.
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

PLUNTZE, J. C.
How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

POLLOCK, D. M.
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

POPOVICH, L.
Southern Discomfort - Learning to Live with the Water Act,
W78-00781 5G

PRATER, B. L.
A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

PRESSER, T. S.
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

PRISCOLI, J. D.
Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

PRITCHARD, R. S.
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

PROKOF'EV, A. A.
Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

QUIRK, W. J.
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

RAMOS, L. S.
Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

RAND, A. G. JR.
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

RANEY, G. L.
Natural Oil Seep Detection in Marine Environments,
W78-00865 5B

RAO, A. RAMACHANDRA
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

RAO, N. S. L.
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

REED, J. R.
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

REED, W. E.
Chemistry of Marine Petroleum Seeps in Relation to Exploration and Pollution,
W78-00864 5B

REEVES, S. G.
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

REID, G. W.
An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

REISH, D. J.
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

RICE, S. D.
Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

RICHEY, E. P.
Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

RICKMAN, R. W.
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

RIEBER, M.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

RILEY, R. T.
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

RINGE, R. R.
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

ROBERTSON, B. R.
Arctic Hydrocarbon Biodegradation,
W78-00600 5B

ROBINS, N. E.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

ROBISCH, P. A.
Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

ROBISON, T. M.
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

ROBY, K. B.
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

ROMANOWICZ, R. J.
Markovian Programming for Flow Regulation,
W78-00621 4A

ROSENBLUETH, E.
Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

ROSSI, O.
Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

ROVIG, L.
The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

ROYER, J. M.
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

RUANE, R. J.
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

RUIVO, M.
Oceanography and the Law of the Sea,
W78-00787 6E

RUSSO, D.
Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

RYBALOVA, B. A.
Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

SACKETT, W. M.
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

SAGI, T.
On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

SAMOSVAT, L. S.
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

SAMOWITZ, C.
Control of Water Pollution in New York City,
W78-00796 6E

SANCHEZ-SESMA, F. J.
Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

SANDU, G.
The Water Regime of Sands and Sandy Soils on the Right Side of the Calmatui River, (In Romanian),
W78-00775 2G

SASSEN, K.
Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

SAUTY, J-P.
A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

SAVALDI, D.
Infiltration Under a Pulsed Water Application: I. The Nature of the Flow System,
W78-00535 2G

SAY, E. W.
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

SCALF, M. R.
Environmental Effects of Septic Tank Systems,
W78-00751 5C

SCHAFFER, R. L.
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

SCHNEIDER, P. A. JR.
Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

SCHNEIDER, R.
Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

SCHUMM, S. A.
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

SCHWARTZ, F. W.
Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

SCOTTER, D. R.
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

SEIJO, M. A.
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

SELLSCHOP, J. P. F.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

SENSABAUGH, W. M.
Problems of Coastal Management,
W78-00801 6E

SHAMIR, U.
Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

SHANNON, L. R.
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

SHARPE, W. E.
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

SHAW, D. G.
Hydrocarbons in the Water Column,
W78-00574 5B

SHEREMET, B. V.
An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

SHERWOOD, C. B.
Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

SHIMIZU, Y.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

SHORT, J. W.
Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

SHUFORD, J. W.
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

SIESENNOP, G. D.
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

SIMON, J. M.
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

SIMONIN, H. A.
Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

SIMONOVIC, S.
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

SMECK, N. E.
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

SMITH, C. L.
Determination of the Leeway of Oil Slicks,
W78-00609 5A

SMITH, J. L.
Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

SMITH, L. L. JR.
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

SMITH, P. M.
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

SODERSTROM, R. S.
The Role of Insurance in Environmental Litigation,
W78-00789 6F

SONNEN, M. B.
Subroutine for Settling Velocities of Spheres,
W78-00528 2J

SOO, S. L.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

SORIANO, A.
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

SOULE, D. F.
Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

SPOONER, J. A.
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

SRIDHARAN, K.
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

STAINKEN, D.
The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

STAMOUDIS, V. C.
The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

STEELE, J. L.
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

STEPHEN-HASSARD, Q. D.
Hawaii and the Manganese Nodule Industry,
W78-00339 6G

STERNBERG, Y. M.
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

STILZ, W. P.
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

STIRLING, H. P.
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

STOCKS, P. K.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

STONE, J. H.
An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

STONE, L. R.
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

STRAUGHAN, D.
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

STRUHSAKER, J. W.
Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

STRUPCZEWSKI, W. G.
General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

Markovian Programming for Flow Regulation,
W78-00621 4A

STUBBLEFIELD, W. L.
Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

STUPICA, T.
Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

SULLIVAN, M. J.
The Distribution of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

SULLIVAN, R. H.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

SUTHERLAND, R. A.
Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

SWIFT, D. J. P.
Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

SZARO, R. C.
Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

SZIDAROVSZKY, F.
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

TALLMAN, D. E.
Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

TATEM, H. E.
Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

TAYLOR, T. L.
Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

TEAL, J. M.
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

THOMAS, J. M.
The Harris Floating Breakwater,
W78-00852 8B

THOMAS, M. L. H.
Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

THOMAS, R. D.
State Legislative Response to the Central Arizona Project,
W78-00707 6E

THOMPSON, B. D.
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

TOKAR, J.
A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

TOUMA, J.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

TOWLE, C. L. JR.
An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

TOWNSEND, R. D.
Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

TRAN, X. L.
Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

TRENHOLM, S. R.
Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

TRIPP, M. R.
Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

TRUOG, E.
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

TSENG, M. T.
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

TUFFEY, T. J.
Atmospheric Reaeration in a Lake,
W78-00561 5G

ULRIKSEN, P.
A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

VACHAUD, G.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

VAN DER WEERD, B.
A Registration Unit for Drain Outflow, Groundwater Depth and Precipitation,
W78-00682 7B

VANDERBORGHT, J-P.
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

VAUCLIN, M.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

VERHAGEN, B. TH.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

VERPLANCKE, H.
Validity of Darcy's Law During the Horizontal Infiltration in a Clay Soil That Is Not Fully Saturated by Water, (In Dutch),
W78-00759 2G

VIGANDER, S.
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

VIUM, M. P.
Computational Hydraulics: An Alternative View,
W78-00524 5B

VOOGT, D. J.
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

VOYNOVA, I. V.
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

WAGENET, R. J.
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

WAITE, G. G.
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

WALDO, S. S.
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

WALSH, G. E.
Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

WANDLE, S. W. JR.
Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

WARD, R. W.
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

WARNER, M. L.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

WATKINS, J.
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

WEBER, J.
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

WEINSTEIN, S. M.
Environmental Assessment Perspectives,
W78-00773 5G

WEISS, F. T.
Effects of Produced Waters on the Marine Environment,
W78-00834 5C

Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

WEISZ, R. N.
An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

WEKELL, M. M.
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

WELBY, C. W.
Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

WELSH, J. P.
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

WENGERT, N.
Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

WENZLOFF, D. R.
Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

WERNER, A. S.
Environmental Assessment Perspectives,
W78-00773 5G

WHIPPLE, W. JR.
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

WHITE, E. L.
Feasibility of Interbasin Water Transfer,
W78-00628 4A

WHITE, I. L.
Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

WHITE, J. D.
Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

WHITMORE, J. C.
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

WHITNEY, D. E.
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

WICKERSHAM, G.
Review of C.E. Jacob's Doublet Well,
W78-00720 8B

WICKINS, J. F.
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

WIDE, S. A.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

WILBER, W. G.
Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

WILDING, L. P.
Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

WILLIAMS, D. C. JR.
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

WILLIAMS, G.
A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

WILLIAMS, H. P.
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

WILLIAMS, S. J.
Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

WILLIS, D. H.
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

WILSON, J. W.
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

WINNER, R.
Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

WINTER, T. C.
Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

WOLF, H. W.
Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

WOLLAST, R.
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

WONG, K.
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

WOOD, M. D.
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

WOODRING, W. T.
Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

WOODRUFF, D. L.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

WOODWELL, G. M.
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

WORMALD, A. P.
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

WRIGHT, J.
Clean Water Progress - Yes, Speed - No,
W78-00791 5G

YAKOWITZ, S.
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

YAMADA, H.
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

YARBROUGH, J. D.
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

YEVJEVICH, V.
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

YEWSIYEVICH, K. M.
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

YOUNG, R. H. F.
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

YU, S. L.
Atmospheric Reaeration in a Lake,
W78-00561 5G

ZINGULA, R. P.
Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

ZOETEMAN, B. C. J.
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

ZUR, B.
Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

ORGANIZATIONAL INDEX

AARHUS UNIV. (DENMARK). INST. OF ECOLOGY AND GENETICS.
The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark),
W78-00538 5B

ABERDEEN UNIV. (SCOTLAND). DEPT. OF ZOOLOGY.
The Mass Mortality of Common Murres in the Irish Sea in 1969,
W78-00881 5C

ACADEMY OF AGRICULTURAL SCIENCES, SOFIA (BULGARIA). INST. OF HYDROTECHNICS AND AMELIORATIONS.
Dependence of Transpiration and Diffusion Pressure in Plants on Soil Moisture Content and Potential, (In Bulgarian),
W78-00515 2D

AGRICULTURAL RESEARCH SERVICE, PENDLETON, OR. COLUMBIA PLATEAU CONSERVATION RESEARCH CENTER.
Chiseling Influences on Soil Hydraulic Properties,
W78-00678 2G

AGRICULTURAL RESEARCH SERVICE, ST. PAUL, MN.
Soil Air Pressure Under Successive Border Irrigations and Simulated Rain,
W78-00536 2G

AGROFIZICHESKII NAUCHNO-ISSLEDOVATELSKII INST., LENINGRAD (USSR).
Water Regime of Plant Controlled by Various Factors Acting on its Root System, (In Russian),
W78-00504 2I

AKADEMIYA NAUK SSSR, LENINGRAD. ZOOLOGICHESKII INST.
A Review of Studies on the Biological Productivity of Benthic Animals in Freshwater Reservoirs of the Soviet Union (Some International Biological Program Results), (In Russian),
W78-00845 2H

AKADEMIYA NAUK SSSR, MOSCOW. INST. OF PLANT PHYSIOLOGY.
Regulative Role of Transpiration in Temperature Regime of Dry Fruits, (In Russian),
W78-00841 2D

AKADEMIYA NAUK URSR, KIEV. INST. HIDROBIOLOGII.
Micro- and Mesobenthos of the Dnieper in the Area of the Future Kanev Water Storage Basin, (In Russian),
W78-00748 2H

AKADEMIYA NAVUK BSSR, MINSK. TSENTRALNY BOTANICHNY SAD.
Hydrophysical Regime of Forest Soils Depending on Forest Cultivation Practices, (In Belorussian),
W78-00540 2G

ALABAMA A AND M UNIV., NORMAL.
Nitrate-Nitrogen and Chloride Movement Through Undisturbed Field Soil,
W78-00520 5B

ALASKA DIV. OF WATER AND HARBORS, JUNEAN.
Practical Applications of Floating Breakwaters for Small Craft Harbors,
W78-00855 8B

ALASKA DIV. OF WATER AND HARBORS, JUNEAU.
Materials and Construction Techniques for Floating Breakwaters,
W78-00854 8B

ALASKA UNIV., COLLEGE.
Arctic Hydrocarbon Biodegradation,
W78-00600 5B

ALASKA UNIV., COLLEGE. INST. OF WATER RESOURCES.
Hydrocarbons in the Water Column,
W78-00574 5B

ALBERTA UNIV., EDMONTON. DEPT. OF GEOLOGY.
Macroscopic Dispersion in Porous Media: The Controlling Factors,
W78-00541 2F

AMERICAN FORESTRY ASSOCIATION, WASHINGTON, DC.
Water Quality Workshops: Talking it Over with EPA,
W78-00782 5G

AMERICAN MEAT INST., WASHINGTON, DC. COMMITTEE ON MEAT PACKING PLANT WASTE DISPOSAL.
An Industrial Waste Guide to the Meat Industry.
W78-00508 5B

AMERICAN PUBLIC WORKS ASSOCIATION, CHICAGO, IL.
Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges. Volume I: Executive Summary,
W78-00752 5D

ARIZONA UNIV., TUCSON. DEPT. OF AGRICULTURAL ECONOMICS.
An Archetypal Linear Programming Model for Optimal Intertemporal Allocation of Groundwater to Agricultural Activities,
W78-00629 4B

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES; AND ARIZONA UNIV., TUCSON. DEPT. OF SYSTEMS AND INDUSTRIAL ENGINEERING.
Bayes Design of a Reservoir Under Random Sediment Yield,
W78-00618 2J

ARIZONA UNIV., TUCSON. SCHOOL OF LAW.
The Role of State Legislation in Ground Water Management,
W78-00658 4B

Uniformity Among Weather Modification Laws,
W78-00745 2B

ARMY ENGINEER DISTRICT, ALBUQUERQUE, NM.
Flood Plain Information: Cottonwood Creek, El Paso County, Colorado.
W78-00757 4A

ARMY ENGINEER DISTRICT, BONNEVILLE, OR. HYDRAULIC LAB.
Spillway and Stilling Basin for Lookout Point Dam, Middle Fork Williamette River, Oregon: Hydraulic Model Investigations,
W78-00549 8B

ARMY ENGINEER DISTRICT, CHARLESTON, SC.
Special Flood Hazard Information Report: Congaree River, Broad River, and Saluda River, Richland and Lexington Counties, South Carolina.
W78-00758 4A

Flood Plain Information: Stoney Branch and Tributaries, Rock Hill, South Carolina.
W78-00760 4A

ARMY ENGINEER DISTRICT, CHICAGO, IL.
Flood Plain Information: East River and Tributaries, City of Green Bay and Brown County, Wisconsin.
W78-00761 4A

Flood Plain Information: Menominee River--Green Bay, Marinette County, WI, Menominee County, MI, Cities of Marinette, WI--Menominee, MI.
W78-00762 4A

ARMY ENGINEER DISTRICT, MEMPHIS, TN.
Flood Plain Information: Beaver Creek and Tributaries, Vicinity of Huntington, Tennessee.
W78-00763 4A

North Fork Obion River, Hoosier Creek, and Grove Creek, Union City, Tennessee.
W78-00764 4A

Flood Plain Information: Sugar Creek, Little Nixon Creek, and Tributaries, Vicinity of Brownsville, Tennessee.
W78-00765 4A

ARMY ENGINEER DISTRICT, NASHVILLE, TN.
Flood Plain Information: Cumberland River, Ashland City, Tennessee.
W78-00766 4A

Flood Plain Information: Cumberland River, Caney Fork River, Carthage, Tennessee.
W78-00767 4A

Flood Plain Information: Sulphur Fork, Springfield, Tennessee.
W78-00768 4A

ARMY ENGINEER DISTRICT, ST. PAUL, MN.
Flood Plain Information: Black Earth Creek, Dane County, Wi-Villages of Mazomanie, Black Earth, and Cross Plains.
W78-00769 4A

ARMY ENGINEER DISTRICT, WALTHAM, MA.
Flood Plain Information: North Nashua River, Fitchburg, and Leominster, Massachusetts.
W78-00770 4A

ARMY ENGINEER DIV. NORTH PACIFIC, BONNEVILLE, OR. HYDRAULICS LAB.
Outlet Works and Stilling Basin, Howard Hanson Dam, Green River, Washington: Hydraulic Model Investigations,
W78-00705 8D

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS.
Accumulation of Naphthalenes by Grass Shrimp: Effects on Respiration, Hatching and Larval Growth,
W78-00593 5B

BATTELLE COLUMBUS LABS., OH.
An Assessment Methodology for the Environmental Impact of Water Resource Projects,
W78-00750 6G

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WA.
Characterization of Volatile Hydrocarbons in Flowing Seawater Suspensions of Number 2 Fuel Oil,
W78-00612 5A

BATTELLE PACIFIC NORTHWEST LABS., SEQUIM, WA. MARINE RESEARCH LAB.
Responses to Sublethal Levels of Petroleum Hydrocarbons: Are They Sensitive Indicators and Do They Correlate with Tissue Concentration,
W78-00581 5A

BATTELLE PACIFIC NORTHWEST LABS., SEQUIM, WA. MARINE RESEARCH LABS.
Bioavailability of Sediment-Sorbed Naphthalenes to the Sipunculid Worm, Phascolosoma Agassizii,
W78-00601 5A

BELGRAD UNIV. (YUGOSLAVIA).
Mathematical Model of Uluova Plain, Turkey - A Training and Management Tool,
W78-00692 2A

BELORUSSIAN STATE UNIV., MINSK (USSR).
Diatom Algae of Pelagic and Coastal Zones, Benthonic and Silt Layers of Lakes of the Narachansk Group in the Belorussian SSR, (In Russian),
W78-00844 2H

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.
Preservation of Correlation in Generated Hydrologic Samples Through Two-Station Models,
W78-00531 2E

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF MECHANICAL ENGINEERING.
Analytic Solution for Drawdown in an Unconfined-Confined Rectangular Aquifer,
W78-00522 2F

BOYCE THOMPSON INST. FOR PLANT RESEARCH, INC., YONKERS, NY.
Epibenthic Invertebrates of Croton Bay in the Hudson River,
W78-00899 5B

BRUSSELS UNIV. (BELGIUM). LAB. D'ENVIRONMENT.
Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis,
W78-00543 5B

BRUSSELS UNIV. (BELGIUM). LAB. D'ENVIRONNNEMENT.
Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis,
W78-00542 5B

BUNDESFORSCHUNGSANSTALT FUER FISCHEREI, HAMBURG (WEST GERMANY). INST. FUER KUESTEN- UND BINNENFISCHEREI.
The Influence of DDT and DDE on the Embryogenesis and the Mortality of Larvae of Cod (Gadus Morhua L.),
W78-00893 5C

BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES, ORLEANS (FRANCE).
A Simplified Model of Salt Water Encroachment in an Aquifer (Un Modele Simplifie Pour La Simulation Des Nappes Avec Intrusion Saline),
W78-00638 2L

BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, WASHINGTON, DC.
The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions,
W78-00784 6E

BUREAU OF OUTDOOR RECREATION, ANN ARBOR, MI. LAKE CENTRAL REGION OFFICE.
Success Stories in Multiple Use,
W78-00660 6B

BUREAU OF RECLAMATION, WASHINGTON, DC.
Westwide Study (Critical Water Problems Facing the Eleven Western States).
W78-00663 4A

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
Water Conditions and Flood Events in California, Water Year 1975-76.
W78-00718 2E

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO. SNOW SURVEYS BRANCH.
Water Conditions in California, Basic Data Supplement.
W78-00545 2B

CALIFORNIA STATE UNIV., LONG BEACH. DEPT. OF BIOLOGY.
The Effect of Petroleum Hydrocarbons on the Survival and Life History of Polychaetous Annelids,
W78-00589 5C

CALIFORNIA UNIV., BERKELEY. DEPT. OF CIVIL ENGINEERING.
Predicting Estuarine Salinity from River Inflows,
W78-00526 2L

CALIFORNIA UNIV., BERKELEY. DEPT. OF FORESTRY AND CONSERVATION.
Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms,
W78-00553 4C

CALIFORNIA UNIV., BERKELEY. OFFICE OF RESEARCH SERVICES.
Finite Element Analyses of Stresses and Movements in Birch Dam,
W78-00701 8D

CALIFORNIA UNIV., LOS ANGELES. OFFICE OF ENVIRONMENTAL SCIENCE AND ENGINEERING.
Water Quality Modeling of a High Mountain Stream,
W78-00623 5B

CASE EXISTOLOGICAL LABS. LTD., VICTORIA (BRITISH COLUMBIA).
CEPEX Hardware: (Now and in the Future),
W78-00837 5C

CATHOLIC UNIV. OF AMERICA, WASHINGTON, DC. LAW SCHOOL.
Nineteenth Century Dams and Twentieth Century Problems: Commentary on a Statutory Solution,
W78-00783 6E

CENTER FOR DISEASE CONTROL, ATLANTA, GA.
Wastes from Small Poultry Dressing Establishments,
W78-00510 5A

CENTER FOR THE ENVIRONMENT AND MAN, INC., HARTFORD, CT.
Precipitation (Radar) Project of the Ifygl Lake Meteorology Program,
W78-00546 2B

CENTER FOR THE STUDY OF DEMOCRATIC INSTITUTIONS, SANTA BARBARA, CA.
International Ocean Institute,
W78-00780 6E

CHEVRON OIL FIELD RESEARCH CO., LA HABRA, CA.
Dispersal and Alteration of Oil Discharged on a Water Surface,
W78-00575 5B

Evaporation and Solution of C2 to C10 Hydrocarbons from Crude Oils on the Sea Surface,
W78-00608 5B

Weathering of Spilled Oil and Methods of Accelerating,
W78-00836 5B

CINCINNATI UNIV., DEPT. OF ENVIRONMENTAL ENGINEERING.
Tannery Waste Management,
W78-00512 5D

CITADEL, CHARLESTON, SC. DEPT. OF BIOLOGY.
Responses of Embryonic Cyathura polita (Stimpson) (Isopoda: Anthuridea) to Varying Salinities,
W78-00887 5C

COAST GUARD RESEARCH AND DEVELOPMENT CENTER, GROTON, CT.
Along-Shore Coherence of Winds Along the North Alaskan Coast for Oil Spill Analysis,
W78-00863 5C

COAST GUARD, WASHINGTON, D.C.
Oil Spills in the Alaskan Coastal Zone - The Statistical Picture,
W78-00573 5B

COAST GUARD, WASHINGTON, DC. OFFICE OF MARINE ENVIRONMENT AND SYSTEMS.
Port Planning to Minimize Risk to Hazardous Material Vessel Movement,
W78-00829 5G

COASTAL ENGINEERING RESEARCH CENTER, FORT BELVOIR, VA.
Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island, New York,
W78-00704 8B

COLD REGIONS RESEARCH AND ENGINEERING LAB., FAIRBANKS, AK.
Sea Ice Thickness Profiling and Under-Ice Oil Entrapment,
W78-00861 5G

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING.
Pulse Irrigation--Design for Operating Sets,
W78-00631 3F

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF EARTH RESOURCES.
Evaluation of the Storage of Diffuse Sources of Salinity in the Upper Colorado River Basin,
W78-00550 2J

COLORADO STATE UNIV., FORT COLLINS. ENGINEERING RESEARCH CENTER.
Extension of the Similarity Hypothesis Used for Modeling the Soil Water Characteristics,
W78-00533 2G

COLORADO UNIV., BOULDER. INST. OF ARCTIC AND ALPINE RESEARCH; AND COOPERATIVE INST. FOR RESEARCH IN ENVIRONMENTAL SCIENCE, BOULDER, CO.
Future Sea-Level Changes Due to West Antarctic Ice Sheet Fluctuations,
W78-00518 2C

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION (U.S. HOUSE).
Clean Water Progress - Yes, Speed - No,
W78-00791 5G

CONTROL DATA CORP., ROCKVILLE, MD. PROFESSIONAL SERVICES DIV.
Implementation Plan for the Cost of a Clean Environment Report.
W78-00772 5G

CORNELL UNIVERSITY, ITHACA, NY. DEPT. OF ENVIRONMENTAL ENGINEERING.
Modelling for Water Resource Systems Planning,
W78-00648 6A

DANISH HYDRAULIC INST., COPENHAGEN. COMPUTATIONAL HYDRAULICS CENTER.
Computational Hydraulics: An Alternative View,
W78-00524 5B

DANISH INST. OF APPLIED HYDRAULICS, COPENHAGEN.
Environmental Conditions on the Continental Shelf Off West Greenland,
W78-00862 5G

DELAWARE UNIV., NEWARK.
Cytological Damage in Mercenaria Mercenaria Exposed to Phenol,
W78-00590 5C

DELAWARE UNIV., NEWARK. DEPT. OF CIVIL ENGINEERING.
The Stability of Emulsified Crude Oils as Affected by Suspended Particles,
W78-00614 5B

DEPARTMENT OF THE ENVIRONMENT, READING (ENGLAND). CENTRAL WATER PLANNING UNIT.
Some Water Resource System Studies in the UK,
W78-00636 4B

DUNSTAFFNAGE MARINE RESEARCH LAB., OBAN (SCOTLAND).
Deep Water Renewal of Loch Etive: A Three Basin Scottish Fjord,
W78-00683 2L

ECONOMIC RESEARCH SERVICE, BROOMALL, PA.
Connecticut River Basin Supplemental Study, New Hampshire, Vermont, Massachusetts and Connecticut. The River's Reach. Phase I. Some Environmental and Flood Plain Management Implications of the Changing Role of Agriculture,
W78-00774 4A

EG AND G ENVIRONMENTAL CONSULTANTS, WALTHAM, MA.
A Technique for Measuring Industrial Waste Dispersion Resulting from Ocean Dumping,
W78-00832 5B

ENVIRO-MEASURE, INC., KNOXVILLE, TN.
Some Effects of Dustfall on Urban Stormwater Quality,
W78-00697 5A

ENVIRONMENTAL PROTECTION AGENCY, NEW YORK. DATA SYSTEMS BRANCH.
A Computer Program for Modeling of Water Quality Parameters in Steady State Multi-Dimensional Natural Aquatic Systems, (Second Edition),
W78-00632 5B

SNSIM1/2 'A Computer Program for the Steady-State Water Quality Simulation of a Stream Network,'
W78-00633 5B

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC.
Regulations: Reactions and Resolution.
W78-00656 5G

ENVIRONMENTAL RESEARCH LAB., GULF BREEZE, FL.
Effects and Uptake of Chlorinated Naphthalenes in Marine Unicellular Algae,
W78-00873 5C

Impairment of Antipredator Behavior in Palaemonetes pugio by Exposure to Sublethal Doses of Parathion,
W78-00874 5C

ENVIRONMENTAL RESEARCH LAB., NARRAGANSETT, RI.
Effects of Certain Petroleum Products on Reproduction and Growth of Zygotes and Juvenile Stages of the Alga Fucus Edentatus De la Pyl,
W78-00584 5C

EOTVOS LORAND UNIV., BUDAPEST (HUNGARY). INST. FOR SYSTEMATIC ZOOLOGY.
Hydroecological and Zoological Examinations in the Pondweed Fields of Lake Ferto, (In Hungarian),
W78-00872 2H

EXECUTIVE OFFICE OF THE PRESIDENT, WASHINGTON, DC.
President Announces Measures to Control Marine Oil Pollution,
W78-00786 6E

EXXON CO., HOUSTON, TX.
Environmental Aspects of Drilling Fluid and Drill Cuttings Disposal,
W78-00833 5C

EXXON PRODUCTION RESEARCH CO., HOUSTON, TX.
Environmental Aspects of Drilling Muds and Cuttings from Oil and Gas Extraction Operations in Offshore and Coastal Waters,
W78-00868 5C

FISH AND WILDLIFE SERVICE, LAUREL, MD. PATUXENT WILDLIFE RESEARCH CENTER.
Effects of External Applications of Fuel Oil on Hatchability of Mallard Eggs,
W78-00587 5C

Effects of External Applications of No. 2 Fuel Oil on Common Eider Eggs,
W78-00588 5C

FISHERIES AND MARINE SERVICE, STE. ANNE DE BELLEVUE (QUEBEC). ARCTIC BIOLOGICAL STATION.
Effects of Dispersed Crude Oil Upon the Respiratory Metabolism of an Arctic Marine Amphipod, Onismus (Boekisimus) Affinis,
W78-00592 5C

FISHERIES AND MARINE SERVICE, WEST VANCOUVER (BRITISH COLUMBIA). RESEARCH AND RESOURCE SERVICE DIRECTORATE.
Primary and Secondary Effects of Stress in Fish: Some New Data with a General Review,
W78-00877 5C

FISHERIES RESEARCH STATION, ABERDEEN (HONG KONG).
Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong and its Role in Estuarine Phosphorus Availability,
W78-00516 5B

FLORIDA DEPT. OF NATURAL RESOURCES, TALLAHASSEE. BUREAU OF BEACHES AND SHORES.
Problems of Coastal Management,
W78-00801 6E

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF OCEANOGRAPHY.
Seasonal Variations of Hydrocarbons in the Water Column of the Mafla Lease Area,
W78-00616 5A

FLORIDA UNIV., GAINESVILLE. DEPT. OF FRUIT CROPS.
Significance of Vegetation in Interpreting Thermal Radiation from a Terrestrial Surface,
W78-00694 7B

GCA CORP., BEDFORD, MA. GCA TECHNOLOGY DIV.
Environmental Assessment Perspectives,
W78-00773 5G

GEOLOGICAL SURVEY, ANCHORAGE, AL. WATER RESOURCES DIV.
Ground-Water Investigation at the Alluvial Fan of the South Fork Eagle River, Anchorage, Alaska - Results of Test Drilling, 1976,
W78-00810 4B

GEOLOGICAL SURVEY, BISMARCK, ND. WATER RESOURCES DIV.
Water Resources Data for North Dakota, Water Year 1976.
W78-00819 7C

GEOLOGICAL SURVEY, BOSTON, MA. WATER RESOURCES DIV.
Estimating the Magnitude and Frequency of Floods on Natural-Flow Streams in Massachusetts,
W78-00812 2E

GEOLOGICAL SURVEY, DENVER, CO. WATER RESOURCES DIV.
Classification of the Hydrologic Settings of Lakes in the North Central United States,
W78-00808 2H

Simulation of Velocity Distribution and Mass Transfer,
W78-00825 2J

Alluvial Channel Bedforms,
W78-00826 2J

GEOLOGICAL SURVEY, FT. BUCHANAN, PR. WATER RESOURCES DIV.
Water Resources of the Maunabo Valley, Puerto Rico,
W78-00813 4A

Ground Water in the Lajas Valley, Puerto Rico,
W78-00822 4B

GEOLOGICAL SURVEY, LAKEWOOD, CO. WATER RESOURCES DIV.
Ground-Water Resources of the Alluvial Aquifers in Northeastern Larimer County, Colorado,
W78-00811 4B

Artificial-Recharge Tests in Upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado,
W78-00821 4B

GEOLOGICAL SURVEY, MENLO PARK, CA. WATER RESOURCES DIV.
Chemical, Isotopic, and Gas Compositions of Selected Thermal Springs in Arizona, New Mexico, and Utah,
W78-00815 4B

GEOLOGICAL SURVEY, MENLO PARK, CA. WATER RESOURCES DIV.; GEOLOGICAL SURVEY, RESTON VA.; AND GEOLOGICAL SURVEY, TALLAHASSEE, FL. WATER RESOURCES DIV.
Distribution of Injected Wastewater in the Saline Lava Aquifer, Wailuku-Kahului Wastewater Treatment Facility, Kahului, Maui, Hawaii,
W78-00814 5B

GEOLOGICAL SURVEY, MIAMI, FL. WATER RESOURCES DIV.
Quantity and Quality of Urban Storm Water in Southeast Florida,
W78-00824 3D

GEOLOGICAL SURVEY OF CANADA, OTTAWA (ONTARIO). RESOURCE GEOPHYSICS AND GEOCHEMISTRY DIV.
The Nature and Behavior of Gases in Natural Waters,
W78-00712 2K

GEOLOGICAL SURVEY, PORTLAND, OR. WATER RESOURCES DIV.
Water Resources Data for Oregon, Water Year 1975.
W78-00817 7C

GEOLOGICAL SURVEY, RESTON, VA. GEOLOGIC DIV.
Relation Between Earthquakes, Weather, and Soil Tilt,
W78-00823 7B

GEOLOGICAL SURVEY, RESTON, VA. WATER RESOURCES DIV.
The Drought,
W78-00807 2B

A Bicentennial Reflection: Streamgauging in the United States,
W78-00809 7A

GEOLOGICAL SURVEY, SALT LAKE CITY, UT. WATER RESOURCES DIV.
Reconnaissance of Water Quality in the Duchesne River Basin and Some Adjacent Drainage Areas, Utah,
W78-00820 5A

GEOLOGICAL SURVEY, TALLAHASSEE, FL. WATER RESOURCES DIV.
Progress Report on Study of Magnitude and Frequency of Floods on Small Drainage Areas in Florida,
W78-00816 4A

GEOLOGICAL SURVEY, TOWSON, MD. WATER RESOURCES DIV.
Jarrettsville Quadrangle Hydrogeology,
W78-00805 7C

Bel Air Quadrangle Hydrogeology,
W78-00806 7C

Water Resources Data for Maryland and Delaware, Water Year 1976.
W78-00818 7C

GEOLOGICAL SURVEY, TUCSON, AZ. WATER RESOURCES DIV.
Maps Showing Ground-Water Conditions in the Northern Part of the Chinle Area, Apache County, Arizona--1976,
W78-00802 7C

Maps Showing Ground-Water Conditions in the Monument Valley and Northern Part of the Black Mesa Areas, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00803 7C

Maps Showing Ground-Water Conditions in the Southern Part of the Black Mesa Area, Navajo, Apache, and Coconino Counties, Arizona--1976,
W78-00804 7C

GEORGIA INST. OF TECH., ATLANTA ENVIRONMENTAL RESOURCES CENTER.
Studies of Saprolite and Its Relation to the Migration and Occurrence of Groundwater in Crystalline Rocks,
W78-00564 2G

GEORGIA UNIV., ATHENS.
State Legislative Response to the Central Arizona Project,
W78-00707 6E

GEORGIA UNIV., ATHENS. INST. OF NATURAL RESOURCES.
A Model for Achieving Consistency for Cost Sharing in Water Resource Programs,
W78-00626 6C

GIESSEN UNIV. (WEST GERMANY). LEHRSTUHL BOTANK (II).
32p, 22N and 99mTc in Experiments Concerning Water Transport in the Aerial Roots of Vanda Tricolor Lindl, (In German),
W78-00858 2I

GOVIND BALLABH PANT UNIV. OF AGRICULTURE AND TECHNOLOGY, PANTNAGAR (INDIA). DEPT. OF AGRICULTURAL ENGINEERING.
Transient Spherical Flow to a Cavity Well of Finite Diameter,
W78-00693 2F

GRAND VALLEY STATE COLL., AVENDALE, MI.
Acclimation of Fathead Minnows and Lake Trout to Residual Chloride and Bromine Chlorine,
W78-00892 5B

GRENOBLE-1 UNIV. (FRANCE). INST. DE MECANIQUE.
Comparison of Methods of Calibration of a Neutron Probe by Gravimetry or Neutron-Capture Model,
W78-00679 2G

GULF COAST RESEARCH LAB., OCEAN SPRINGS, MS.
Sediment Hydrocarbons as Environmental Indicators in the Northeast Gulf of Mexico,
W78-00613 5A

HARVARD LAW SCHOOL, CAMBRIDGE, MA.
The Proposed Outer Continental Shelf Lands Act Amendments of 1976: An Inadequate Guide to Outer Continental Shelf Development,
W78-00800 6E

HARYANA AGRICULTURAL UNIV., HISSAR (INDIA).
A Study of the Reliability, Deficiencies and Excesses of Rainfall Over the Haryana State,
W78-00698 2B

HAWAII STATE DEPT. OF PLANNING AND ECONOMIC DEVELOPMENT, HONOLULU.
Hawaii and the Manganese Nodule Industry,
W78-00839 6G

HAWAII UNIV., HONOLULU. DEPT. OF CIVIL ENGINEERING.
Water Quality and Effluent Standards of Hawaii,
W78-00652 5G

HAWAII UNIV., HONOLULU. DEPT. OF MECHANICAL ENGINEERING.
Similarity Solutions for Convection of Groundwater Adjacent to Horizontal Impermeable Surfaces with Axisymmetric Temperature Distribution,
W78-00532 2F

HEIDELBERG COLL., TIFFIN, OHIO.
A 96-Hour Bioassay of Otter Creek, Ohio,
W78-00890 5A

HIROSHIMA UNIV. (JAPAN). DEPT. OF FISHERIES.
Studies on the Oil Pollution of Sediments in the Seto Inland Sea,
W78-00571 5B

HOWARD (CHARLES) AND ASSOCIATES LTD., WINNIPEG (MANITOBA).
Multiple Objective Optimization Model for Real-Time Operation of a Water Supply System,
W78-00645 4A

Hierarchical Multiple Objective Analysis of Land and Water Resource Utilization for a System of Lakes,
W78-00646 4A

ICHTHYOLOGICAL ASSOCIATES, INC., DRUMORE, PA.
Impingement of Fishes at Peach Bottom Atomic Power Station, Pennsylvania,
W78-00875 8I

IDAHO COOPERATIVE FISHERY RESEARCH UNIT, MOSCOW.
Abundance, Growth, Distribution and Movements of White Sturgeon in the Mid-Snake River,
W78-00552 8I

ILLINOIS STATE ENVIRONMENTAL PROTECTION AGENCY, SPRINGFIELD.
Reservoir Yield: An Important Environmental Parameter,
W78-00627 4A

INDIAN INST. OF SCIENCE, BANGALORE. DEPT. OF CIVIL ENGINEERING.
Critical Reynolds Number for Orifice and Nozzle Flows in Pipes,
W78-00525 8B

INDUSTRIAL ENVIRONMENTAL RESEARCH LAB.-CINCINNATI, EDISON, NJ. OIL AND HAZARDOUS MATERIALS SPILLS BRANCH.
The Accumulation and Depuration of No. 2 Fuel Oil by the Soft Shell Clam, Mya Arenaria L.,
W78-00604 5B

INSTITUT FUER WASSERWIRTSCHAFT, BERLIN (EAST GERMANY).
Multipurpose Use of Catchment Models for Operational Forecasting and Planning Studies,
W78-00635 2A

INSTITUT ZA VODOPRIVREDU JAROSLAV CERNI, BELGRADE (YUGOSLAVIA).
Simulation Models of the Velika Morava Basin for Design of a Multipurpose Reservoir System,
W78-00639 4A

INSTITUTE FOR LAND AND WATER MANAGE RESEARCH, WAGENINGEN (NETHERLANDS).
A Registration Unit for Drain Outflow, Groundwater Depth and Precipitation,
W78-00682 7B

INSTITUTE FOR WATER RESOURCES (ARMY), FORT BELVOIR, VA.
Integrating Social Analysis into Water Resources Planning: Some Emerging Trends in the Corps of Engineers,
W78-00625 6B

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., NEW YORK.; AND MARINE TECHNOLOGY SOCIETY, WASHINGTON, DC.
Oceans '77 Conference Record.
W78-00827 5G

INSTITUTE OF GEOLOGICAL SCIENCES, LONDON (ENGLAND).
Observation Well Response Time and Its Effect Upon Aquifer Test Results,
W78-00523 4B

INSTITUTO DE PESQUISA AGROPECUARIA DO CENTRO-SUL, MATO GROSSO (BRAZIL).
The Occurrence of Drought and its Probabilities in the Baixada Fluminense, Rio De Janeiro, (In Portugese),
W78-00843 2A

INSTITUTUL DE STUDII SI CERCETARI PEDOLOGIE, BUCHAREST (RUMANIA).
The Water Regime of Sands and Sandy Soils on the Right Side of the Caimatui River, (In Romanian),
W78-00775 2G

Contributions to the Study of Water Balance Elements in the Reddish-Brown Soil Area of Baneasa-Bucharest, (In Romanian),
W78-00776 2D

IOWA COOPERATIVE FISHERY RESEARCH UNIT, AMES.
Size-Related Factors Associated with Dieldrin Concentrations in Muscle Tissue of Channel Catfish Ictalurus Punctatus,
W78-00882 5C

IOWA UNIV., IOWA CITY. INST. OF HYDRAULIC RESEARCH.
Model Study of the Inlet and Sump on the Clinton First Avenue Pump Station,
W78-00717 8C

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Water and Energy Conservation Through Efficient Irrigation Management,
W78-00566 3F

KARADENIZ TEKNIK UNIV., TRABZON (TURKEY). DEPT. OF CIVIL ENGINEERING AND ARCHITECTURE.
Steady Infiltration from a Ditch: Theory and Experiment,
W78-00708 4A

KEELE UNIV. (ENGLAND). DEPT. OF GEOLOGY.
Effects of Varying Discharge Regimes on Bed-Form Sedimentary Structures in Modern Rivers,
W78-00696 2J

KIEL UNIV. (WEST GERMANY). INST. FUER MEERESKUNDE.
Residues of Chlorinated Hydrocarbons in Cod Livers from the Kiel Bight in Relation to Some Biological Parameters,
W78-00891 5A

KIEV INST. FOR THE ADVANCED TRAINING OF PHYSICIANS (USSR).
Colorimetric Method of Determination of Amiben in Air, Water and Soil,
W78-00700 5A

LENINGRAD STATE UNIV. (USSR).
Dispersion Analysis of the Effect of Ecological Conditions on the Variability of the Water Content in Meadow Plant Leaves, (In Russian),
W78-00744 2I

LINK BELT CO., COLMAR, PA.
Vibrating Screens in Industrial Waste Water Treatment,
W78-00507 5D

LJUBLIJANA, UNIV. (YUGOSLAVIA). FACULTY OF BIOTECHNOLOGY.
Changes in Pore-Size Distribution Caused by Soil Packing Through Pressure, (In Slovenian),
W78-00622 2G

LOUISIANA STATE UNIV., BATON ROUGE. CENTER FOR WETLAND RESOURCES.
An Evaluation of Louisiana Superport Studies and Implications for Coastal Zone Management,
W78-00871 5G

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF CIVIL ENGINEERING.
Possible Failure of the Low-Sill Control Structure at Old River, Louisiana, Economic and Physical Consequences,
W78-00719 2E

LOUISVILLE UNIV., KY. DEPT. OF BIOLOGY.
Studies on Petroleum Biodegradation in the Arctic,
W78-00599 5B

MACDONALD COLL., STE ANNE DE BELLEVUE (QUEBEC). DEPT. OF RENEWABLE RESOURCES.
Soluble and Sediment Nitrogen Losses as Related to Land Use and Type of Soil in Eastern Canada,
W78-00689 5B

MAINE STATE DEPT. OF MARINE RESOURCES, WEST BOOTHBAY HARBOR. RESEARCH LAB.
Salinity Acclimation in the Soft-Shell Clam, Mya Arenaria,
W78-00879 5C

MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM, PLYMOUTH (ENGLAND). PLYMOUTH LAB.
Factors Affecting the Retention of a Petroleum Hydrocarbon by Marine Planktonic Copepods,
W78-00602 5A

MARINE BIOLOGICAL LAB., WOODS HOLE, MA.
The Flax Pond Ecosystem Study: Exchanges of Carbon in Water Between a Salt Marsh and Long Island Sound,
W78-00539 5B

MARYLAND UNIV., COLLEGE PARK. DEPT. OF CIVIL ENGINEERING.
Maryland Highway Drainage Study: Volume VII - An Investigation of the Vertical and Horizontal Hydraulic Conductivities of Dense Base Course Aggregates,
W78-00544 4C

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF METEOROLOGY.
A Comparative Study of the Effects of Albedo Change on Drought in Semi-Arid Regions,
W78-00686 2B

MASSACHUSETTS UNIV., AMHERST. DEPT. OF GEOGRAPHY; AND MASSACHUSETTS UNIV., AMHERST. DEPT. OF LAW.
The National Flood Insurance Program: Some Midstream Perspectives,
W78-00747 6F

MASSACHUSETTS UNIV., GLOUCESTER. MARINE STATION.
The Effects of Petroleum Hydrocarbons on Marine Populations and Communities,
W78-00583 5C

MASSEY UNIV., PALMERSTON NORTH (NEW ZEALAND). DEPT. OF SOIL SCIENCE.
Drainage Flux in Permeable Soil Underlain by a Coarse-Textured Layer,
W78-00675 2G

MCGILL UNIV., MONTREAL (QUEBEC). DEPT. OF CIVIL ENGINEERING AND APPLIED MECHANICS.
Large Waste Treatment Systems: Design for Both Efficiency and Inflow Level of Each Process,
W78-00647 5D

MCKENNA, STORER, ROWE, WHITE AND FARRUG, CHICAGO, IL.
The Role of Insurance in Environmental Litigation,
W78-00789 6F

MENDES AND MOUNT, NEW YORK.
Oil Pollution of Coastal and Inland Waters Under the Water Quality Improvement Act of 1970,
W78-00790 5G

META SYSTEMS, INC., CAMBRIDGE, MA.
Discussion 'Regional Planning for Land Disposal of Wastewater,' by R.E. Markland, Et Al.,
W78-00644 5E

METEOROLOGICAL COLL., KASHIWA, CHIBA PREF., (JAPAN).
On the Distribution of Nitrate Nitrogen in the Pacific Ocean,
W78-00547 2L

MIAMI UNIV., FL. SCHOOL OF LAW.
Four Monographs for the General Reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Law of the Sea),
W78-00778 6E

MIAMI VALLEY REGIONAL PLANNING COMMISSION, DAYTON, OH.
Legal Critical Factor Analysis (In Compliance with the Area-Wide Waste Treatment Management Planning Program).
W78-00651 5G

MICHIGAN UNIV., ANN ARBOR, BIOLOGICAL STATION.
Inland Lake Protection in Northern Michigan (Northern Michigan Environmental Research Program Educational Series: Publication No. 1),
W78-00716 6G

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, CONWAY (WALES). FISHERIES EXPERIMENT STATION.
The Tolerance of Warm-Water Prawns to Recirculated Water,
W78-00883 5C

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LONDON (ENGLAND).
Land Drainage in England and Wales,
W78-00691 4A

MINNESOTA UNIV., ST. PAUL.
Effect of Soil Strength on Soil Detachment Due to Raindrop Impact,
W78-00677 2G

MINNESOTA UNIV., ST. PAUL. DEPT. OF ENTOMOLOGY, FISHERIES AND WILDLIFE.
Chronic Toxicity of Guthion to the Fathead Minnow (Pimephales Promelas Rafinesque),
W78-00880 5C

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE. DEPT. OF BOTANY.
The Distribuion of Diatoms in Mississippi Salt Marshes,
W78-00555 5B

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE. DEPT. OF CHEMICAL ENGINEERING.
Detoxification by Bark Filtration of Shock Loads to Secondary Treatment Systems,
W78-00556 5D

Dual Media Filtration of Waste Stabilization Pond Effluent,
W78-00557 5D

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE. DEPT. OF SOCIOLOGY.
A Comparison of Interorganizational Relationships Within Two Contiguous Watershed Districts,
W78-00559 6E

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE. DEPT. OF ZOOLOGY.
Aldrin and Dieldrin Uptake in Insecticide-Resistant and Susceptible Mosquitofish (Gambusia affinis),
W78-00896 5C

MOSCOW STATE UNIV. (USSR). DEPT. OF SOIL SCIENCE.
Effect of Transpiration of Soil Water Availability, (In Russian),
W78-00506 2D

An Experiment in Reclaiming the Floodplain Land, (In Russian),
W78-00519 2G

MOSUL UNIV. (IRAQ). DEPT. OF CIVIL ENGINEERING.
Armoring Process in Degrading Streams,
W78-00527 2J

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CLEVELAND, OH. LEWIS RESEARCH CENTER.
Computer Program for Calculating Pressure-Broadened Raman Spectra for Molecular Nitrogen and Oxygen,
W78-00703 2K

NATIONAL BUREAU OF STANDARDS, WASHINGTON, DC. ANALYTICAL CHEMISTRY DIV.
Interlaboratory Calibration for the Analysis of Petroleum Levels in Sediment,
W78-00607 5A

NATIONAL MARINE FISHERIES SERVICE, AUKE BAY, AL. AUKE BAY FISHERIES LAB.
Comparative Oil Toxicity and Comparative Animal Sensitivity,
W78-00580 5A

Molting and Survival of King Crab (Paralithodes Camschatica) and Coonstrip Shrimp (Pandalus Hypsinotus) Larvae Exposed to Cook Inlet Crude Oil Water-Soluble Fractions,
W78-00595 5C

Response of the Clam, Macoma Balthica (Linnaeus), Exposed to Prudhoe Bay Crude Oil as Unmixed Oil, Water-Soluble Fraction, and Oil-Contaminated Sediment in the Laboratory,
W78-00596 5C

NATIONAL MARINE FISHERIES SERVICE, MILFORD, CT. MIDDLE ATLANTIC COASTAL FISHERIES CENTER.
Trace Metal Content of Plankton and Zooplankton Collected from the New York Bight and Long Island Sound,
W78-00859 5C

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WA. NORTHWEST AND ALASKA FISHERIES CENTER.
Biotransformation of Petroleum Hydrocarbons in Marine Organisms Indigenous to the Arctic and Subarctic,
W78-00577 5B

The Effects of Petroleum Hydrocarbon Exposure on the Structure of Fish Tissues,
W78-00582 5A

Effect of Crude Oil on Trout Reproduction,
W78-00585 5C

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WA. NORTHWEST FISHERIES CENTER.
Effects of Chlorinated Biphenyls and Petroleum Hydrocarbons on the Activity of Hepatic Aryl Hydrocarbor Hydroxylase of Coho Salmon (Oncorhynchus Kisutch) and Chinook Salmon (O. Tshawytscha),
W78-00605 5C

Intertidal Sediment Hydrocarbon Levels at Two Sites on the Strait of Juan De Fuca,
W78-00611 5A

NATIONAL MARINE FISHERIES SERVICES, TIBURON, CA. TIBURON LAB.
Effects of Benzene on Growth, Fat Content, and Caloric Content of Striped Bass, Morone Saxatilis,
W78-00884 5C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FL. ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABS.
Time and Space Variation in the Surficial Sediments of the New York Bight Apex,
W78-00684 2L

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, OAK RIDGE, AIR RESOURCES ATMOSPHERIC TURBULENCE AND DIFFUSION LABORATORY, TN.
1975 Annual Report.
W78-00721 5A

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, OAK RIDGE, TN. AIR RESOURCES ATMOSPHERIC TURBULENCE AND DIFFUSION LAB.
Summary of Activities and Plans-FY 1976-1977,
W78-00722 5A

Meteorological Effects of Energy Dissipation at Large Power Parks,
W78-00723 5A

Turbulent Diffusion-Typing Schemes: A Review,
W78-00724 5A

Photographic Assessment of Deciduous Forest Radiation Regimes,
W78-00725 2B

Modeling Smog Along the Los Angeles-Palm Springs Trajectory,
W78-00726 5A

Research Required for Predicting the Behavior of Pressurized Gases Escaping into the Atmosphere,
W78-00727 5A

Time Dependent Mesoscale Wind Fields Over Complex Terrain,
W78-00728 2B

Atmospheric Dispersion Models for Environmental Pollution Applications,
W78-00729 5A

Urban Diffusion Problems,
W78-00730 5A

Relative Diffusion of Tetroon Pairs During Convective Conditions,
W78-00731 2B

Dispersion of Sulfur Dioxide Emissions from Area Sources,
W78-00732 5A

Standard Deviation of Wind Direction as a Function of Time; Three Hours to Five Hundred Seventy-Six Hours,
W78-00733 2B

Validation of a Multisource Dispersion Model for Atmospheric Sulfur Concentrations,
W78-00734 5A

Beam Enrichment of Diffuse Radiation in a Deciduous Forest,
W78-00735 2B

Plume Rise Predictions,
W78-00736 5A

Predicted and Observed Cooling Tower Plume Rise and Visible Plume Length at the John E. Amos Power Plant,
W78-00739 5A

A Note on Diffusion from Some Simple Extended Sources Treated as a Collection of Gaussian Point Sources,
W78-00740 5A

Estimation of Downwash Effects,
W78-00741 5A

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.

Ocean Dumping -- Research and Monitoring of Ocean Disposal Effects,
W78-00830 5C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, DC.

Coastal Zone Management Program Development Grants.
W78-00777 2L

NATIONAL RESEARCH DEVELOPMENT CORP., LONDON (ENGLAND).

The 'Seabreaker' Floating Breakwater,
W78-00850 8B

NEVADA UNIV. SYSTEM, RENO. WATER RESOURCES CENTER.

The Virgin River Basin Study: A Regional Approach to Multiobjective Planning for Water and Related Resources,
W78-00551 6B

NEW BRUNSWICK UNIV., ST. JOHN. DEPT. OF BIOLOGY.

Long Term Biological Effects of Bunker C Oil in the Intertidal Zone,
W78-00597 5C

NEW ENGLAND RIVER BASINS COMMISSION, BOSTON, MA.

New England River Basins Commission Findings and Recommendations on the Connecticut River Basin Comprehensive Water and Related Land Resources Investigation.
W78-00746 6B

NEW HAMPSHIRE UNIV., DURHAM. WATER RESOURCES RESEARCH CENTER.

Effects of Sludge Applications on Soil Water and Vegetation in a Northern Hardwood Forest in New England,
W78-00567 5B

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ECONOMICS AND AGRICULTURAL BUSINESS.

Water for Energy: An Approach to Comprehensive Impact Assessment,
W78-00624 6G

NEW YORK CITY DEPT. OF WATER RESOURCES.

Control of Water Pollution in New York City,
W78-00796 6E

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, ALBANY.

Toxicity of Methoxychlor and Naled to Several Life Stages of Landlocked Atlantic Salmon,
W78-00888 5C

NEWCASTLE UNIV. (AUSTRALIA). DEPT. OF GEOGRAPHY.

Sediment Transport from a Rural Catchment in New South Wales,
W78-00680 2J

NEWFOUNDLAND FOREST RESEARCH CENTRE, ST. JOHN'S.

A Porous Cup Soil-Water Sampler with Volume Control,
W78-00529 2G

NORTH CAROLINA STATE UNIV. AT RALEIGH. DEPT. OF GEOSCIENCES.

Utilization of EREP Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina,
W78-00715 7B

NORTH CAROLINA UNIV. AT CHAPEL HILL. DEPT. OF ENVIRONMENTAL SCIENCE AND ENGINEERING.

Heuristic Algorithm for Wastewater Planning,
W78-00630 5D

NORTH CAROLINA UNIV. AT CHAPEL HILL. SCHOOL OF PUBLIC HEALTH.

Rendering Plant Waste Treatment Studies, II. Pilot Plant Investigations,
W78-00509 5D

Rendering Plant Waste Treatment Studies,
W78-00513 5A

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF AGRICULTURAL ECONOMICS.

Evaluation of Alternative Uses of Wetlands, (Part II),
W78-00503 6B

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF CHEMISTRY.

Reactions of Organomercury (I) Compounds with Ligands Contained in Natural Water Systems,
W78-00502 5A

NORTH DAKOTA WATER RESOURCES RESEARCH INST., FARGO.

Hydrologic Modeling of the Devils Lake Basin Watersheds,
W78-00569 4D

OAK RIDGE NATIONAL LAB., TN.

Chemistry of Sulfur in the Atmosphere,
W78-00738 5A

OAKLAND UNIV., ROCHESTER, MN. DEPT. OF BIOLOGICAL SCIENCES.

Physiologic and Environmental Factors Influencing the Calcium-to-Tissue Ratio in Populations of Three Species of Freshwater Pulmonate Snails,
W78-00889 5C

OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER, WOOSTER. DEPT. OF AGRONOMY.

Quality of Water Discharged from Three Small Agronomic Watersheds in the Maumee River Basin,
W78-00688 5B

OKLAHOMA UNIV., NORMAN. BUREAU OF WATER AND ENVIRONMENTAL RESOURCES RESEARCH.

An Urban Model for the Evaluation of Alternative Growth Policies,
W78-00649 6A

OKLAHOMA UNIV., NORMAN. SCIENCE AND PUBLIC POLICY PROGRAM.

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume II-Detailed Analyses and Supporting Materials,
W78-00754 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume III-Preliminary Policy Analysis,
W78-00755 6G

OKLAHOMA UNIV., NORMAN. SCIENCE AND PUBLIC POLICY PROGRAM; AND RADIAN CORP., AUSTIN, TX.

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Volume I-Summary Report,
W78-00753 6G

Energy from the West: A Progress Report of a Technology Assessment of Western Energy Development. Volume IV-Appendices,
W78-00756 6G

OREGON STATE UNIV., CORVALLIS. DEPT. OF GENERAL SCIENCE.

Chemical Carcinogens in the Marine Environment Benzo(a)pyrene in Economically Important Bivalve Mollusks from Oregon Estuaries,
W78-00615 5B

OREGON STATE UNIV., NEWPORT. MARINE SCIENCE CENTER.

Effects of a Seawater-Soluble Fraction of Cook Inlet Crude Oil and Its Major Aromatic Components on Larval Stages of the Dungeness Crab, Cancer Magister,
W78-00594 5C

OTAGO UNIV., DUNEDIN (NEW ZEALAND). DEPT. OF GEOGRAPHY.

A Test for Distinguishing Between Extreme Value Distributions,
W78-00681 2E

OTTAWA UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.

Prediction of Mercury Distribution in River Sediments,
W78-00517 5B

PARMA UNIV. (ITALY). LAB. DI ECOLOGIA.

Santo Parmense Lake (Northern Apennines): Physiography and Dynamics of the Mesoplanktonic Population, (In Italian),
W78-00847 2H

PEMBROKE STATE UNIV., NC. DEPT. OF PHYSICS.

Asymptotic Solutions of a Simple Urban Dispersion Model for Chemical Pollutants,
W78-00737 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Feasibility of Interbasin Water Transfer,
W78-00628 4A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF SANITARY ENGINEERING.
Treatment of Waste from Small Slaughterhouses,
W78-00511 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. SCHOOL OF FOREST RESOURCES.
The Impact of Water Saving Device Installation Programs on Resource Conservation,
W78-00563 3D

Pennsylvania Water Resources Research Center Technology Transfer Programs - A Case Study,
W78-00565 4B

POLISH ACADEMY OF SCIENCES, WARSAW. INST. OF GEOPHYSICS.
Markovian Programming for Flow Regulation,
W78-00621 4A

General Markov Model for Optimal Control Reservoirs,
W78-00642 4A

PORTUGESE, STATE SECRETARIAT FOR FISHERIES, LISBON.
Oceanography and the Law of the Sea,
W78-00787 6E

PURDUE UNIV., LAFAYETTE, IND. WATER RESOURCES RESEARCH CENTER.
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Application of Linear Systems Analysis to Ground Water Evaluation Studies,
W78-00570 2F

READING UNIV. (ENGLAND). SEDIMENTOLOGY RESEARCH LAB.
Recent Carbonate Sedimentation in Connemara, Western Ireland,
W78-00685 2L

RESEARCH INST. FOR WATER RESOURCES DEVELOPMENT. BUDAPEST (HUNGARY).
The Calculation of Water Shortage Indices by Using Information About the Concomitance of Water Resources and Demands,
W78-00640 6D

A Work-Help for the Calculation of Water Restriction Indices,
W78-00643 6D

RHODE ISLAND UNIV., KINGSTON. COLL. OF PHARMACY.
Toxins of the Gonvaulax sp. and Infested Bivalves in Owase Bay,
W78-00878 5C

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CHEMICAL ENGINEERING; RHODE ISLAND UNIV. KINGSTON. DEPT. OF FOOD SCIENCE AND TECHNOLOGY; AND RHODE ISLAND UNIV., KINGSTON. DEPT. OF MICROBIOLOGY.
Fermentation and Enzymatic Saccharification of Cellulose and Lignin Waste,
W78-00554 5D

RHODE ISLAND UNIV., KINGSTON. DEPT. OF OCEAN ENGINEERING.
1974 Floating Breakwaters Conference Papers.
W78-00840 8B

Scrap Tire Floating Breakwaters,
W78-00853 8B

RHODE ISLAND UNIV., KINGSTON. DEPT. OF ZOOLOGY.
Trace Metals in Liver from Bluefish, Tautog and Tilefish in Relation to Body Length,
W78-00897 5A

RIJKSINSTITUUT VOOR DRINKWATERVOORZIENING, THE HAGUE (NETHERLANDS).
The Veluwe Artificial Recharge Plan Water Quality Aspects,
W78-00690 5G

ROBERT S. KERR ENVIRONMENTAL RESEARCH LAB., ADA, OK.
Environmental Effects of Septic Tank Systems,
W78-00751 5C

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Atmospheric Reaeration in a Lake,
W78-00561 5G

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, NJ. WATER RESOURCES RESEARCH INST.
Advantages and Disadvantages of Regional Sewerage Systems,
W78-00562 5G

RUTGERS UNIV., NEW BRUNSWICK, NJ. DEPT. OF ENVIRONMENTAL SCIENCES.
Aquatic Transport of Heavy Metals in the Urban Environment,
W78-00742 5B

SALFORD UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.
The Thermal Structure of Small Lakes: The Influence of a Modified Wind Speed,
W78-00534 2H

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CA. PHYSIOLOGICAL RESEARCH LAB.
Thermal Conductance of Immersed Pinniped and Sea Otter Pelts Before and After Oiling with Prudhoe Bay Crude,
W78-00586 5A

SHELL DEVELOPMENT CO., HOUSTON, TX; AND EXXON PRODUCTION RESEARCH CO., HOUSTON, TX.
Effects of Produced Waters on the Marine Environment,
W78-00834 5C

SKIDAWAY INST. OF OCEANOGRAPHY, SAVANNAH, GA.
Fate of Petroleum Hydrocarbons in Marine Animals,
W78-00835 5B

SKIDWAY INST. OF OCEANOGRAPHY, SAVANNAH, GA.
Accumulation and Turnover of Petroleum Hydrocarbons in Marine Organisms,
W78-00578 5B

SOUTH DAKOTA STATE UNIV. BROOKINGS, DEPT. OF CIVIL ENGINEERING.
Suggested Criteria for Irrigation Water Intakes in Missouri River Reservoirs, South Dakota,
W78-00706 8I

SOUTH DAKOTA UNIV. VERMILLION. DEPT. OF BIOLOGY.
Mercuric Chloride Uptake by Eggs of the Ricefish and Resulting Teratogenic Effects,
W78-00885 5C

STANFORD UNIV., CALIF. DEPT. OF ENGINEERING.
Effects of NEPA's Review and Comment Process on Water Resource Planning (Survey Results),
W78-00654 6G

STATE UNIV. OF NEW YORK AT BUFFALO, AMHERST. SEA GRANT LAW CENTER.
Coastal Zone Legal References, 1976.
W78-00657 6E

STONE AND WEBSTER ENGINEERING CORP., BOSTON, MA. ENVIRONMENTAL DIV.
Use of the Leslie Matrix for Assessing Environmental Impact with an Example for a Fish Population,
W78-00876 8I

TECHNION - ISRAEL INST. OF TECH., HAIFA. FACULTY OF AGRICULTURAL ENGINEERING; AND TECHNION - ISRAEL INST. OF TECH., HAIFA. SOILS AND FERTILIZERS LAB.
Infiltration Under a Pulsed Water Application: 1. The Nature of the Flow System,
W78-00535 2G

TECHNISCHE HOCHSCHULE, DARMSTADT (WEST GERMANY). FACHBEREICH FUER ANORGANISCHE CHEMIE UND KERNCHEMIE.
The Behaviour of Mercury in the System Water - Fish,
W78-00898 5B

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA. WATER QUALITY AND ECOLOGY BRANCH.
Aeration of Hydro Releases at Ft. Patrick Henry Dam,
W78-00711 5G

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF BIOLOGY.
Interactive Effects of Temperature, Salinity Shock and Chronic Exposure to No. 2 Fuel Oil on Survival, Development Rate and Respiration of the Horseshoe Crab, Limulus Polyphemus,
W78-00591 5C

Effects of Temperature and Salinity of Naphthalenes Uptake in the Temperature Clam, Rangia Cuneata and the Boreal Clam, Prototaca Staminea,
W78-00603 5C

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF GEOLOGY.
Physical Factors Affecting the Siting of Dredged Material Islands,
W78-00838 5C

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF OCEANOGRAPHY.
Input of Low-Molecular Weight Hydrocarbons from Petroleum Operations into the Gulf of Mexico,
W78-00610 5B

TEXAS UNIV. AT AUSTIN.
Biodegradation of Aromatic Petroleum Hydrocarbons,
W78-00576 5B

TEXAS UNIV. AT AUSTIN. CENTER FOR RESEARCH IN WATER RESOURCES.
Models for Optimizing the Multipurpose Operation of a Reservoir System,
W78-00634 4A

THESSALONIKI UNIV., SALONIKA (GREECE) DEPT. OF CIVIL ENGINEERING.
Two-Dimensional Model for Two-Layer Flow,
W78-00713 8B

UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, (MEXICO). INST. DE INGENIERIA.
Hydrodynamic Pressure in Semicylindrical Reservoir,
W78-00714 8B

UNIVERSITAET HOHENHEIM (LANDWIRTSCHAFTLICHE HOCHSCHULE) (WEST GERMANY). ABT. OKOHYSIOLOGISCHES VEG.
The Concept of Hydrature and Its Meaning for the Water Balance of Plants, (In German),
W78-00653 2I

UNIVERSITE SCIENTIFIQUE ET MEDICALE DE GRENOBLE (FRANCE). INST. DE MECANIQUE.
A Comparison of Exact and Numerical Solutions of the Diffusion Equation Near Singularities,
W78-00530 2G

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. INST. OF MARINE AND COASTAL STUDIES.
Biological Survey of Intertidal Areas in the Straits of Magellen in January, 1975, Five Months After the Metula Oil Spill,
W78-00598 5B

Palau: Native Paradise or Petroleum Superport,
W78-00828 5C

UNIVERSITY OF SOUTHERN MISSISSIPPI, HATTIESBURG. BUREAU OF BUSINESS RESEARCH.
Costs of Errors in Defining a Community's Flood Plain,
W78-00558 6F

UNIVERSITY OF SOUTHERN MISSISSIPPI, HATTIESBURG. DEPT. OF GEOLOGY.
Hydrologic and Biologic Characteristics of Natural Channels in Coastal Marsh of Mississippi,
W78-00568 5B

UNIVERSITY OF SOUTHERN MISSISSIPPI, HATTIESBURG. INST. OF ENVIRONMENTAL SCIENCE.
Pentachlorophenol Distribution in a Fresh Water Ecosystem,
W78-00886 5B

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG (SOUTH AFRICA). NUCLEAR PHYSICS RESEARCH UNIT.
Northern Kalahari Groundwaters: Hydrologic, Isotopic and Chemical Studies at Orapa, Botswana,
W78-00521 2F

UPPSALA UNIV. (SWEDEN). DEPT. OF METEOROLOGY.
Monthly Rainfall in the Uppsala-Field,
W78-00548 2B

UTAH STATE UNIV., LOGAN. DEPT. OF SOIL SCIENCE AND BIOMETEOROLOGY.
Kinetics of Salt Release from a Saline Soil,
W78-00676 2G

VERMONT UNIV., BURLINGTON. DEPT. OF ZOOLOGY.
Toxicity of Water-Soluble Gasoline Fractions to Fourth-Instar Larvae of the Mosquito Aedes aegypti L.,
W78-00900 5C

VICTORIA MINISTRY FOR CONSERVATION, MELBOURNE (AUSTRALIA).
Distribution of Petroleum Hydrocarbons in Westernport Bay (Australia): Results of Chronic Low Level Inputs,
W78-00617 5B

VIRGINIA INST. OF MARINE SCIENCE, CLOUCESTER POINT.
The Fate of Petroleum Hydrocarbons from a No. 2 Fuel Oil Spill in a Seminatural Estuarine Environment,
W78-00606 5B

VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Determination of the Leeway of Oil Slicks,
W78-00609 5A

VIRGINIA INST. OF MARINE SCIENCES, GLOUCESTER POINT, VA.
Application of Numerical Classification in Ecological Investigations of Water Pollution,
W78-00771 6G

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY; AND VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. CENTER FOR ENVIRONMENTAL STUDIES.
Critical Species, Including Man, Within the Biosphere,
W78-00619 5G

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF CIVIL ENGINEERING.
Field-Laboratory Determined Avoidances of the Spotfin Shiner and the Bluntnose Minnow to Chlorinated Discharges,
W78-00895 5A

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DIV. OF ENVIRONMENTAL AND URBAN SYSTEMS; AND VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKBURG. SCHOOL OF FORESTRY AND WILDLIFE RESOURCES.
A Watershed Planning and Management System: Design and Synthesis,
W78-00560 4D

VOLCANI INST. OF AGRICULTURAL RESEARCH, BET-DAGAN (ISRAEL).
Analysis of the Saturated-Unsaturated Hydraulic Conductivity in a Mixed Sodium-Calcium Soil System,
W78-00709 2G

Effect of Mixed NA-CA Solutions on the Hydraulic Properties of Unsaturated Soils,
W78-00710 2G

VOORHEES (ALAN M.) AND ASSOCIATES, INC., MCLEAN, VA.
Interim Guide for Environmental Assessment: HUD Field Office Edition.
W78-00749 6G

WASHINGTON STATE DEPT. OF SOCIAL AND HEALTH SERVICES, OLYMPIA.
How Will Small Utilities Comply with the Safe Drinking Water Act,
W78-00655 5G

WASHINGTON UNIV., SEATTLE. APPLIED PHYSICS LAB.
Techniques for Measuring the Effects of Nuclear Power Plants on Local Fish,
W78-00831 5C

WASHINGTON UNIV., SEATTLE. ARCTIC ICE DYNAMICS JOINT EXPERIMENT OFFICE.
Prediction of Arctic Ice Conditions for Operations,
W78-00860 5G

WASHINGTON UNIV., SEATTLE. CENTER FOR QUANTITATIVE SCIENCE IN FORESTRY, FISHERIES, AND WILDLIFE.
Design of Trend Monitoring Networks,
W78-00695 5A

WASHINGTON UNIV., SEATTLE. DEPT. OF MECHANICAL ENGINEERING.
Theoretical Analysis of Floating Breakwater Performance,
W78-00842 8B

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Nitrification and Denitrification in Marine Sediments from Puget Sound,
W78-00537 5B

WASHINGTON UNIV., SEATTLE. OCEAN ENGINEERING RESEARCH LAB.
Prototype Performance Characteristics of a Floating Breakwater,
W78-00849 8B

WASHINGTON UNIV., SEATTLE. SCHOOL OF LAW.
Thou Shalt Not Fill Public Waters Without Public Permission - Washington's Lake Chelan Decision,
W78-00788 6E

WATER RESOURCES CENTRE, BUDAPEST (HUNGARY).
Hydrological System Reliability at the Confluence of Rivers,
W78-00637 4A

WATER RESOURCES DEVELOPMENT AND CONSTRUCTION, PRAGUE (CZECHOSLOVAKIA).
Chance Constrained Model of Water Resources Systems,
W78-00641 4A

WATER RESOURCES ENGINEERS, INC., WALNUT CREEK, CA.
Subroutine for Settling Velocities of Spheres,
W78-00528 2J

WATER RESOURCES ENGINEERS, SPRINGFIELD, VA.
Evaluation of Flood Risk Factors in the Design of Highway Stream Crossings,
W78-00699 8B

WATERLOO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Bayesian Model Discrimination for BOD Analysis,
W78-00620 5A

WESTERN KENTUCKY UNIV., BOWLING GREEN.
The Effects of Mine Acid on the Pond River Watershed in Western Kentucky,
W78-00894 5C

WISCONSIN UNIV., MADISON. DEPT. OF SOILS.
Sewage Effluent Disposal Through Crop Irrigation,
W78-00514 5E

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MA.
Food Chain Transfer of Hydrocarbons,
W78-00579 5B

Marine Scientific Research and the Law of the Sea Conference: Some Proposed Amendments to the Revised Text,
W78-00779 6E

WYOMING UNIV., LARAMIE. DEPT. OF ATMOSPHERIC SCIENCE.
Lidar Observations of High Plains Thunderstorm Precipitation,
W78-00687 2B

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
The Potential Impact of Coal-Energy Development on Agriculture Land Resources in Wyoming's Powder River Basin,
W78-00505 6B

ACCESSION NUMBER INDEX

W78-00501 2L
W78-00502 5A
W78-00503 6B
W78-00504 2I
W78-00505 6B
W78-00506 2D
W78-00507 5D
W78-00508 5B
W78-00509 5D
W78-00510 5A
W78-00511 5D
W78-00512 5D
W78-00513 5A
W78-00514 5E
W78-00515 2D
W78-00516 5B
W78-00517 5B
W78-00518 2C
W78-00519 2G
W78-00520 5B
W78-00521 2F
W78-00522 2F
W78-00523 4B
W78-00524 5B
W78-00525 8B
W78-00526 2L
W78-00527 2J
W78-00528 2J
W78-00529 2G
W78-00530 2G
W78-00531 2E
W78-00532 2F
W78-00533 2G
W78-00534 2H
W78-00535 2G
W78-00536 2G
W78-00537 5B
W78-00538 5B
W78-00539 5B
W78-00540 2G
W78-00541 2F
W78-00542 5B
W78-00543 5B
W78-00544 4C
W78-00545 2B
W78-00546 2B
W78-00547 2L
W78-00548 2B
W78-00549 8B
W78-00550 2J
W78-00551 6B
W78-00552 8I
W78-00553 4C
W78-00554 5D
W78-00555 5B
W78-00556 5D
W78-00557 5D
W78-00558 6F
W78-00559 6E
W78-00560 4D
W78-00561 5G
W78-00562 5G
W78-00563 3D
W78-00564 2G
W78-00565 4B
W78-00566 3F
W78-00567 5B
W78-00568 5B
W78-00569 4D
W78-00570 2F
W78-00571 5B
W78-00572 5C
W78-00573 5B
W78-00574 5B
W78-00575 5B
W78-00576 5B
W78-00577 5B
W78-00578 5B
W78-00579 5B
W78-00580 5A
W78-00581 5A
W78-00582 5A
W78-00583 5C
W78-00584 5C
W78-00585 5C
W78-00586 5A
W78-00587 5C
W78-00588 5C
W78-00589 5C
W78-00590 5C
W78-00591 5C
W78-00592 5C
W78-00593 5B
W78-00594 5C
W78-00595 5C
W78-00596 5C
W78-00597 5C
W78-00598 5B
W78-00599 5B
W78-00600 5B
W78-00601 5A
W78-00602 5A
W78-00603 5C
W78-00604 5B
W78-00605 5C
W78-00606 5B
W78-00607 5A
W78-00608 5B
W78-00609 5A
W78-00610 5B
W78-00611 5A
W78-00612 5A
W78-00613 5A
W78-00614 5B
W78-00615 5B
W78-00616 5A
W78-00617 5B
W78-00618 2J
W78-00619 5G
W78-00620 5A
W78-00621 4A
W78-00622 2G
W78-00623 5B
W78-00624 6G
W78-00625 6B
W78-00626 6C
W78-00627 4A
W78-00628 4A
W78-00629 4B
W78-00630 5D
W78-00631 3F
W78-00632 5B
W78-00633 5B
W78-00634 4A
W78-00635 2A
W78-00636 4B
W78-00637 4A
W78-00638 2L
W78-00639 4A
W78-00640 6D
W78-00641 4A
W78-00642 4A
W78-00643 6D
W78-00644 5E
W78-00645 4A
W78-00646 4A
W78-00647 5D
W78-00648 6A
W78-00649 6A
W78-00650 6E
W78-00651 5G
W78-00652 5G
W78-00653 2I
W78-00654 6G
W78-00655 5G
W78-00656 5G
W78-00657 6E
W78-00658 4B
W78-00659 6E
W78-00660 6B
W78-00661 6E
W78-00662 4B
W78-00663 4A
W78-00664 6E
W78-00665 6E
W78-00666 6E
W78-00667 6E
W78-00668 6E
W78-00669 6E
W78-00670 6E
W78-00671 6E
W78-00672 6E
W78-00673 6E
W78-00674 6E
W78-00675 2G
W78-00676 2G
W78-00677 2G
W78-00678 2G
W78-00679 2G
W78-00680 2J
W78-00681 2E
W78-00682 7B
W78-00683 2L
W78-00684 2L
W78-00685 2L
W78-00686 2B
W78-00687 2B
W78-00688 5B
W78-00689 5B
W78-00690 5G
W78-00691 4A
W78-00692 2A
W78-00693 2F
W78-00694 7B
W78-00695 5A
W78-00696 2J
W78-00697 5A
W78-00698 2B
W78-00699 8B
W78-00700 5A
W78-00701 8D
W78-00702 5A
W78-00703 2K
W78-00704 8B
W78-00705 8D
W78-00706 8I
W78-00707 6E
W78-00708 4A
W78-00709 2G
W78-00710 2G
W78-00711 5G
W78-00712 2K
W78-00713 8B
W78-00714 8B
W78-00715 7B
W78-00716 6G
W78-00717 8C
W78-00718 2E
W78-00719 2E
W78-00720 8B
W78-00721 5A
W78-00722 5A
W78-00723 5A
W78-00724 5A
W78-00725 2B
W78-00726 5A
W78-00727 5A
W78-00728 2B
W78-00729 5A
W78-00730 5A
W78-00731 2B
W78-00732 5A
W78-00733 2B
W78-00734 5A
W78-00735 2B
W78-00736 5A
W78-00737 5A
W78-00738 5A
W78-00739 5A
W78-00740 5A
W78-00741 5A
W78-00742 5B
W78-00743 8B
W78-00744 2I
W78-00745 2B
W78-00746 6B
W78-00747 6F
W78-00748 2H
W78-00749 6G
W78-00750 6G
W78-00751 5C
W78-00752 5D
W78-00753 6G
W78-00754 6G
W78-00755 6G
W78-00756 6G
W78-00757 4A
W78-00758 4A
W78-00759 2G
W78-00760 4A
W78-00761 4A
W78-00762 4A
W78-00763 4A
W78-00764 4A
W78-00765 4A
W78-00766 4A
W78-00767 4A
W78-00768 4A
W78-00769 4A
W78-00770 4A
W78-00771 6G
W78-00772 5G
W78-00773 5G
W78-00774 4A
W78-00775 2G
W78-00776 2D
W78-00777 2L
W78-00778 6E
W78-00779 6E
W78-00780 6E
W78-00781 5G
W78-00782 5G
W78-00783 6E
W78-00784 6E
W78-00785 5G
W78-00786 6E
W78-00787 6E
W78-00788 6E
W78-00789 6F
W78-00790 5G
W78-00791 5G
W78-00792 6E
W78-00793 6E
W78-00794 6E
W78-00795 6E
W78-00796 6E
W78-00797 6E
W78-00798 6E
W78-00799 5G
W78-00800 6E
W78-00801 6E
W78-00802 7C
W78-00803 7C
W78-00804 7C
W78-00805 7C
W78-00806 7C
W78-00807 2B
W78-00808 2H
W78-00809 7A
W78-00810 4B
W78-00811 4B
W78-00812 2E

W78-00813 4A
W78-00814 5B
W78-00815 4B
W78-00816 4A
W78-00817 7C
W78-00818 7C
W78-00819 7C
W78-00820 5A
W78-00821 4B
W78-00822 4B
W78-00823 7B
W78-00824 3D
W78-00825 2J
W78-00826 2J
W78-00827 5G
W78-00828 5C
W78-00829 5G
W78-00830 5C
W78-00831 5C
W78-00832 5B
W78-00833 5C
W78-00834 5C
W78-00835 5B
W78-00836 5B
W78-00837 5C
W78-00838 5C
W78-00839 6G
W78-00840 8B
W78-00841 2D
W78-00842 8B
W78-00843 2A
W78-00844 2H
W78-00845 2H
W78-00846 2H
W78-00847 2H
W78-00848 2L
W78-00849 8B
W78-00850 8B
W78-00851 4A
W78-00852 8B
W78-00853 8B
W78-00854 8B
W78-00855 8B
W78-00856 8B
W78-00857 8B
W78-00858 2I
W78-00859 5C
W78-00860 5G
W78-00861 5G
W78-00862 5G
W78-00863 5C
W78-00864 5B
W78-00865 5B
W78-00866 5G
W78-00867 5C
W78-00868 5C
W78-00869 5G
W78-00870 5G
W78-00871 5G
W78-00872 2H
W78-00873 5C
W78-00874 5C
W78-00875 8I
W78-00876 8I
W78-00877 5C
W78-00878 5C
W78-00879 5C
W78-00880 5C
W78-00881 5C
W78-00882 5C
W78-00883 5C
W78-00884 5C
W78-00885 5C
W78-00886 5B
W78-00887 5C
W78-00888 5C
W78-00889 5C
W78-00890 5A
W78-00891 5A
W78-00892 5B
W78-00893 5C
W78-00894 5C
W78-00895 5A
W78-00896 5C
W78-00897 5A
W78-00898 5B
W78-00899 5B
W78-00900 5C

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
Colorado State University, Irrigation Return Flow Quality	W78-00745	1
Cornell University, Policy Models for Water Resources Systems	W78-00619--00621 00623--00649 00707	31
Illinois State Water Survey, Hydrology	W78-00516--00518 00520--00539 00541--00549 00618 00675--00705 00708--00743	100
University of Florida, Eastern U. S. Water Law	W78-00650--00652 00654--00674 00777--00801	49
University of N. Carolina, Metropolitan Water Resources Planning and Management	W78-00746--00747 00749--00758 00760--00774	27
B. STATE WATER RESOURCES RESEARCH INSTITUTES	W78-00502--00503 00505 00550--00569 00706	24
C. OTHER		
BioSciences Information Service	W78-00501, 00504 00506, 00515 00519, 00540 00622, 00653 00744, 00748 00759 00775--00776 00841 00843--00848 00851, 00858 00872	23

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
C. OTHER (CONTINUED)		
Environmental Information Services, Inc. (Effects of Pollutants on Aquatic Life)	W78-00571--00617 00874--00900	74
Environmental Protection Agency	W78-00507--00514	8
Ocean Engineering Info. Service (Outer Continental Shelf)	W78-00827--00840 00842 00849--00850 00852--00857 00859--00871 00873	37
Office of Water Research and Technology	W78-00570	1
U. S. Geological Survey	W78-00802--00826	25

☆U.S. GOVERNMENT PRINTING OFFICE: 1978-261-081/15

TAL

74

8

37

1

25